Trains

DECEMBER '41

25¢

Photo-Special

Also [illegible]
Locomotive [illegible]
Railroad Treasurer
Ma[illegible] R.R.
and others.

[illegible] by H. [illegible] Vollrath.
See page 9.

Courtesy Southern Pacific

Handing up the train orders. Conductors and enginemen often pick up train orders without stopping, using this time-tried method. The orders are tied to a light wooden or bamboo hoop, and after the trainman removes his copies he throws the hoop back on the ground for the station agent or operator to retrieve. A train-order signal (double-armed semaphore as in background above) is used to notify the crew that orders are to be picked up. If the operator is out next to the track with hoops the engineer knows the orders (on Form 19) are to be taken on the fly. If no one is in sight, the engineer knows the orders are Form 31, or restricting orders for which the train must come to a stop. In this case the conductor goes into the office, signs the operator's copy, and his signature is transmitted to the dispatcher before the order is made effective. Train orders are used only to direct those unusual train operations which are not provided for by timetable, such as extra sections or trains, meeting or passing of trains at different places than in timetable, slow speed over repair work, and running on wrong main track. Notice the photographer in the left background of the picture. Action subjects such as this are meat for railroad photographers, and defense regulations have in most cases not interfered with picture taking around passenger stations. Better ask permission first just to be safe.

Trains

Editors: A. C. Kalmbach, Linn H. Westcott, Willard V. Anderson

Vol. 2 December, 1941 No. 2

Waybills

During the past six years the total number of start-to-stop runs at 60 miles per hour or more in the United States and Canada has increased from 644 to 1529, while the total mile-a-minute mileage jumped from 2,205 in 1936 to 85,872 in 1941, despite demands made upon the railroads by troop movements and shipments of war and defense materials. These figures were announced December 1 by *Railroad Magazine's* sixth annual speed survey.

Perhaps the little railroads have more personality, but when it comes to putting on a real show there's nothing quite like the New York Division of the Pennsylvania Railroad. If Ringling's could only get it under the Big Top! We know Ringling's can't do that, but we're encompassing this greatest railroad show on earth between the covers of the January TRAINS. Watch for it.

The best of railroad photographs appear every month in TRAINS—50, 60, or more of them. This magazine has made every effort not only to choose the pictures which best portray the American railroad scene, but to reproduce them effectively. Men who like good photos of interesting subject matter subscribe by the year so as not to miss an issue. Domestic rate for 12 issues, mailed flat in envelopes, is $2.50, and copies back to November, 1940, can be furnished at the regular rate.

Everyone has a favorite kind of train. I like mail trains, solid mail trains. To me they are the whole spirit of railroading expressed in that old saying, "The mails must go through." There's variety about a mail train, too, with its storage cars from various roads, its railway postoffice cars and rider car. A glare of headlight, a red glow from the fire box, swirling dust and smoke, and the red markers disappear into the night. The mail train is gone, but tomorrow night I'll be down to see it again. I'm funny that way.

A. C. K.

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Waybills engraving courtesy New Haven Register.

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Florence & Cripple Creek

★ **Famous narrow gauge line of an earlier day hauled rich ores through a scenic empire.**

In Phantom Canyon between Florence and Cripple Creek, Colo., you can drive leisurely over one of the most beautiful of all mountain highways. The grades are easy, curves sweep from side to side of the rocky gorge, and here and there you'll see an unforgettable natural picture up the canyon as you cross an ancient bridge.

Few visitors today realize they are driving over the same rocky ballast that supported many a little narrow gauge train of the old Florence & Cripple Creek Railroad. It was the great costs of World War I and the depletion of the mines that brought on the death and dismantling of the F&CC, terminating a service dating back to 1894.

Cripple Creek was one of the last of the nineteenth century boom towns. It sprang up almost overnight from a small mountain sheep ranch to a thriving city when rich ore was discovered nearby. Three railroads soon reached the district, the Midland Terminal, the F&CC, and the Colorado Springs & Cripple Creek District; only the F&CC was a three-foot gauge line. Eventually all the railroads went under the same ownership, costs mounted (gold ore is worth less in a period of prosperity), and the F&CC and CS&CCD were torn up. Today a new drainage tunnel has opened up new possibilities and the surviving Midland Terminal (all that is left of another famous old

Both photographs, L. C. Mc Clure, 2128 Glenarm Pl., Denver, Colo. See page 24.

line, the Colorado Midland) is being kept very busy.

One of the outstanding features of the Florence & Cripple Creek was the double bow knot, left, which was necessary to lift the line out of a narrowing canyon. On the top level near the skyline is a freight train bound for Cripple Creek. Because grades were so stiff, often 4 per cent, it was common on the old narrow gauges to use several engines to work a train.

On the middle level, and heading down hill, is a three-coach passenger train used to haul miners and tourists. In those days the tourist business flourished, not only in the Rockies, but all over the country.

After the line passed the bow knot, known as a "loop," it went around precipitous cliffs like that in the picture above; notice the depth of the canyon to the right.

These valleys no longer echo the shrill whistle blasts of little engines. The smell of cindery smoke and the blasts of whistles have given way to monoxide and two-tone horns.

The Ma & Pa

By William Moedinger Jr.

BALTIMORE, Md., and York, Pa., two industrially active cities with a combined population of very near one million and separated by 45 miles of rugged, rolling, agriculturally rich river hills, are joined by three railroad lines. While two of the three lines are but relatively small parts of much larger systems, the third, and most circuitous, represents a railroad lock, stock, and barrel. It is a railroad with roots vested in two narrow-gauge pikes conceived a year or two after the Civil War, completed during the third quarter of the century, converted to standard gauge, and finally merged about the turn of the century

William Moedinger Jr., 23 E. Vine St., Lancaster, Pa.

★ Two narrow gauge lines were the ancestors of this successful and picturesque standard gauge railroad.

to form the present system, familiarly known to local residents, shippers, and railfans as the "Ma & Pa."

The 40-year-old Maryland & Pennsylvania Railroad is a standard gauge, single track, independently owned and operated railroad performing efficient and frequent passenger and freight service over a meandering 77-mile main line between Baltimore and York, wth a two-mile branch from Delta to Slate Hill, Pa., and a one-mile branch from Dallastown Junction to Dallastown, Pa. Between the two terminals some 50 small communities are served directly by this railroad, none of them by any other road. But the largest has only 4,757 people!

You may well ask how this little railroad survives not only the competition of hordes of trucks, buses, and private automobiles, but that of the two much larger Class 1 railroads operating lines between Baltimore and York. It seems even more unusual that "Ma & Pa" should survive when we look at a map showing the three railroads. The two competitors are the Pennsylvania Railroad and the Western Maryland Railway. The Pennsy line is double tracked with 130-pound rail and is 20 miles shorter between terminals. In addition it serves as a link in the Pennsy's main line between Washington and the West over which such trains as the *Liberty Limited* and the *Southerner* operate. The Western Maryland Railway joins the two cities with a 65-mile line. Athough this company has eliminated all passenger connections with York, the line is well maintained and bids for and gets a substantial share of freight traffic southbound from York.

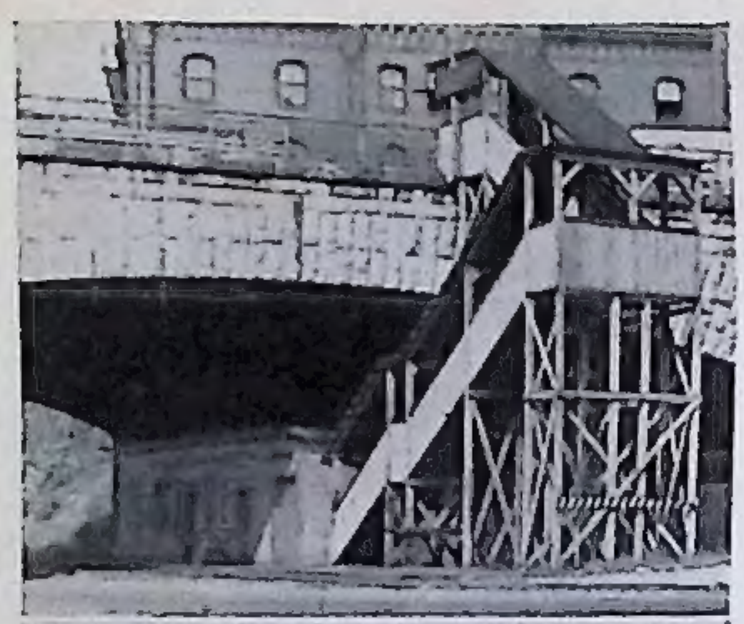
The whole story in a nut shell is that if Ma & Pa intends to survive, she must sell enough carload transportation to industries along her line to provide for operating and administrative expenses, since she cannot hope to obtain a share of through traffic, nor a passenger or l. c. l. business profitable in itself. Neither does Ma & Pa have 9000 miles of railroad elsewhere to fall back on if traffic is temporarily insufficient here, nor is she tapping some rich mining area with unlimited resources necessary to the country as a whole.

Freight, lifeblood of a railroad.

At this crossing of Deep Creek just south of Rocks, Md., the Ma & Pa is straight, at least for a train length, and on a water level grade. The southbound daily freight moves right along behind its heavy Consolidation, No. 42, a rarity as 2-8-0's seldom have such modern touches as the feedwater heater behind the headlight. At Rocks the railroad passes through a narrow 200-foot deep gap, one of many such scenic attractions along the meandering and up and down route. Rocks is but a hamlet of 100 people, with postoffice, grocery store, feed and dairy business, and two other small establishments, and yet it is a regular stop for the four daily passenger trains. From such small communities is the traffic of the 80-mile Ma & Pa built.

Coming Next Month.

Walt Disney wanted a locomotive with a personality to pull the circus train in *Dumbo*, his new feature-length picture, and he got it by assigning the job to animator Ward Kimball, proprietor of the Grizzly Flats Railroad, narrow gauge Mogul, coach, enginehouse, and 650 feet of track all in the Kimball back yard! All this, with pictures makes interesting reading in the January TRAINS.



Perhaps it all happened for the best that two narrow gauge railroads of the seventies were surveyed and partially built in the direction of the seaboard. Although the route is far from direct, viewed as an artery of traffic between the terminals, the very fact that the railroad is so indirect, meandering around many hills, across streams and summits and through narrow valleys, tapping small mineral deposits and many communities of some industrial importance, accounts for the continued existence of the company today.

In and around those 50 or more communities along the line are over 80 industries, each of which requires at least one private siding. Including the above industries, Ma & Pa serves a total of more than 150 enterprises with carload freight, and it is this abundance of carload freight which supports the railroad.

Stations.

Least pretentious of all Maryland & Pennsylvania passenger stations is that at the biggest city on the line, Baltimore. The covered stairs leading from the North Avenue Bridge to track level are the most noticeable portion of the structure. Much larger is the Delta, Pa., station (second from top), where once the two narrow gauge lines met. Main line to York diverges to the left; straight track is Slate Hill Branch. Third photo shows the southbound freight pulling into Delta. Bridgeton, Pa., station (fourth photo) is typical of many small rural stops on unimproved roads, while the fifth photo shows the largest station on the line, the northern terminal at York. Exhaust merrily chuffing, the afternoon freight passes Baldwin, Md. (bottom), on its way to Baltimore.

William Moedinger Jr.

Back in 1901 and continuing until several years before World War I there were few automobiles and improved roads. Ma & Pa handled tons of local and l. c. l. freight in addition to hundreds of thousands of passengers annually. Farm produce, cattle, and milk from the adjacent farms, slate and marble from the nearby quarries, cigars, cigar boxes, and furniture from the Red Lion district, and farmers, commuters, salesmen, and just plain townsfolk swamped the railroad with plenty of traffic, sufficient to keep 13 or 14 locomotives busy. Local freight and passenger business was the order of the day. The 54 way stations bustled with activity. Passengers, mail, milk, and express accounted for 50 per cent of total revenue. There were at least four passenger trains operating from terminal to terminal in addition to numerous commuter trains between Belair, Md., and Baltimore, and between Delta, Pa., and York. Every Wednesday and Saturday extra trains were run between Belair and Baltimore. Five American type engines and two Ten-Wheelers were used to handle these passen-

ger trains. Between the passenger trains the dispatcher managed to squeeze the local freights handled by four light Consolidations.

Around 1915 Detroit began to make itself heard and traffic began to change on the Ma & Pa. Year after year passenger, milk, l. c. l. and local traffic declined. Passenger trains were discontinued. By 1921 two passenger locomotives had been retired, scrapped, and sold for junk. The number of little wooden box cars which the company used for l. c. l. and local freight decreased.

But with all these changes revenue of the railroad continued to increase. New industries were springing up along the line like mushrooms, industries operated on a carload basis, industries which regularly received and shipped a carload or two at a tme. The freights were stopping less along the line to pick up a crate or two of poultry or eggs or to unload a sack or two of feed from the mill up the line or a plow from one of the mail order houses. Increasingly the freight trains were made up of sealed cars with carload freight to or from points scattered all over the 48 states.

The loss of local freight and l. c. l. traffic was not important. The carload freight was more than compensating for it. In 1926 the freight tonnage exceeded the 400,000 ton mark, or in other words approximately 12,000 loaded cars made their way over some part of the railroad. In the same year the railroad carried in excess of 187,000 persons.

Since 1926 traffic of all classes has decreased. Until 1929 the decline was not serious, but the next three or four years saw freight tonnage drop to slightly above half of what it was in 1926 while passenger traffic decreased to one-seventh of the 1926 volume. Since 1933 the traffic of all classes has increased somewhat. Figures for the most recent available years show traffic and revenues to be more or less holding their own and fluctuating with current business conditions. Like every other railroad in the country, traffic has not returned to the Maryland & Pennsylvania in proportion to the increase of industrial activity. The motor truck has made heavy inroads into freight traffic, especially certain commodities on which the freight rate is higher, such as furniture from the Red Lion district and other finished products, and into the door to door l. c. l. business.

Let it never be said that the management was not progressive. As far back as 1913 the company purchased two yard goats not only to free the available locomotives for road work but to better handle the interchange work that seemed to be growing. And while the light Consolidations were far from antiquated, the management placed an order for two heavy locomotives, which were delivered in 1914. They were preparing for carload traffic with an eye to the future. The two heavy Consolidations were especially built to navigate a short line with plenty of curves, some of them as sharp as 20 degrees, on grades averaging up to 2.3 per cent. The new engines were built to haul heavier trains and to relieve the already-overworked light Consolidations, built to give shippers and consignees along the line daily service without fail, to prevent any carload traffic from standing on the interchange tracks at either of the terminals or on the shippers' sidings for lack of sufficient motive power to move it. By 1925 the railroad had received another engine very similar to the earlier two.

The present system is the result of the consolidation of the 44-mile Baltimore & Lehigh Railway Company operating between Baltimore and Delta (actually right on the state line) and the York Southern Railroad, a 34-mile road operating between York and Delta, making a physical connection with the Baltimore & Lehigh Railway at the state line.

The York Southern Railroad was converted to standard gauge about 1895 while the connecting railroad to the south was converted from the three-foot gauge in 1900. Both railroads were operated as independent standard gauge railroads until 1901, when the two were consolidated to form the present Maryland &

On the cover.

Closeup photographs of any part of a locomotive are recognizable at once, but perhaps no part so reveals the personality of a particular engine as does the smokebox front. H. K. Vollrath, "Sterling," Franklin, La., snapped the cover shot of Reading 1064 at speed from a passing gondola car.

Linn H. Westcott

Maryland & Pennsylvania map.

No railroad route is exactly a straight line through the rolling country between Baltimore and York. A glance at the map shows how much more circuitous is the Maryland & Pennsylvania trackage on the right. The roundabout route makes little difference to a road which does not bid for through business. Ma & Pa lives off of and in turn benefits the small towns of the countryside through which it passes, paying its wages, taxes, and bills, and going serenely on its way. From Baltimore to the state line the grade cuts directly across the drainage furrows of the coastal plain, sort of tough going even for the one-time narrow gauge, but from Delta to York the line follows typical river valley grades with a summit at Red Lion. The trip down Muddy Creek Valley from the latter city almost to Delta is, as the winding track and the topography indicate, a scenic gem. The wide V of the route, sweeping so far east from the air line between terminals, was born of the fact that Ma & Pa was originally two roads, both of which planned to build east to Philadelphia, one from Baltimore and the other from York.

Letter from reader.

"Thank you, TRAINS, for making my life more interesting. I never knew railroads could be such fun. And more thanks to my cousin Evelyn for starting it all by giving me TRAINS for Christmas last year." So writes a typical reader. For friend or relative, give a subscription to TRAINS, the happy solution to the gift problem. You give not only a magazine, but a whole new world in which to live . . . and the memory of this thoughtfulness will linger for years. Use the enclosed blank, sending $2.50 per name now for your gift list. We'll send an attractive gift card if you wish.

Pennsylvania Railroad. The company has operated as such ever since.

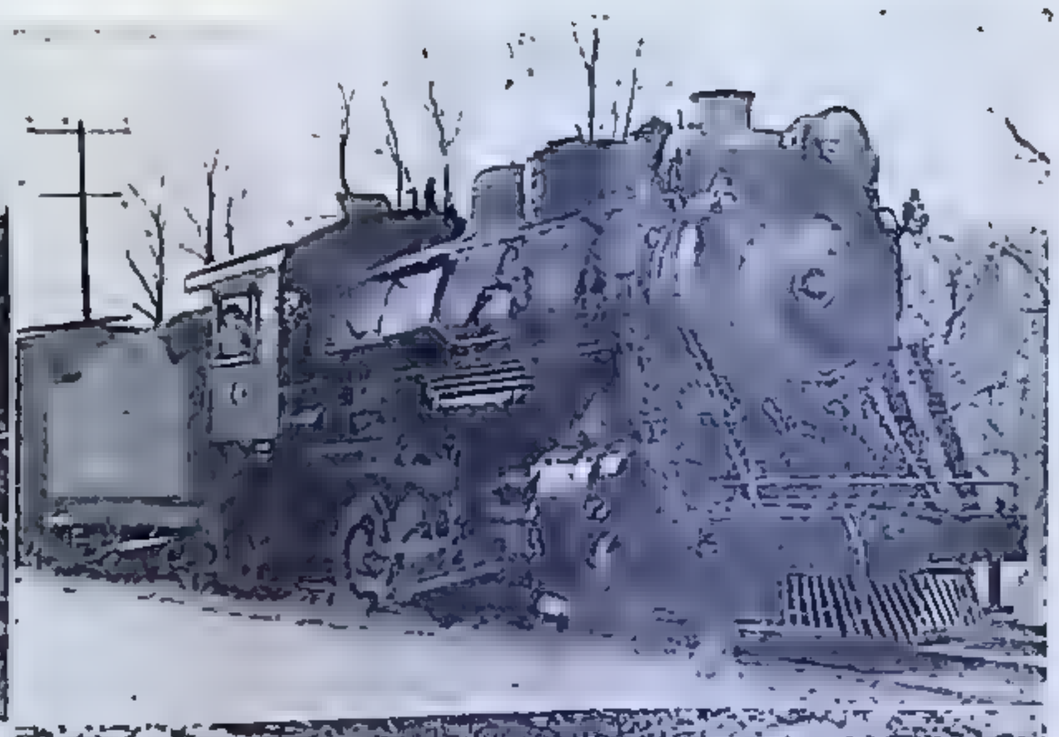
The railroads involved in the 1901 consolidation were by no means the original companies. From the beginning both lines were built and operated as narrow gauge railroads, and neither was originally constructed with the intention of forming a through route between the present terminals.

The railroad in Pennsylvania, or the northern half of the present system, was chartered in 1868 for the purpose of building a line from the coal fields of central Pennsylvania, where today the famous narrow gauge East Broad Top Railroad operates, to Philadelphia. The company was chartered as the Peach Bottom Railway Company and for construction purposes was divided into divisions. The Western Division comprised the line west of York; the Middle Division, the line from York to Susquehanna River; and the Eastern Division, the line from the east bank of the Susquehanna River to Philadelphia.

By 1878 the Middle Division was completed, and, as time was to tell, no work was ever done on the Western Division, while the Eastern Division completed about 20 miles of narrow gauge railroad from the Susquehanna River to Oxford, Pa. The contemplated bridge across the Susquehanna River never got beyond the paper stage. All freight to be transported from one division to the other was ferried across the river, and at one time there was an interchange of carload freight. A flat boat fitted with three-foot tracks carried the small freight cars from one side of the river to the other. In 1881 the railroad was thrown into financial difficulty and the two divisions were acquired by separate interests. The Middle Division became the York & Peach Bottom Railway Company.

The line in Maryland, or the southern portion of the present system, was chartered in 1867 as the Maryland Central Railroad Company for the purpose of building a railroad from Baltimore via Belair, Md., to Philadelphia by crossing the Susquehanna River near the present site of the great Conowingo hydro-electric plant. Fifteen years later this company was granted a new charter for the purpose of absorbing the Baltimore & Delta Railway Company, which had actually started construction 11 years after the formation of the first Maryland Central.

By 1885 the Maryland Central Railroad Company was operating narrow gauge trains into Delta, but in 1888 went bankrupt and reorganized as the Maryland Central Railway Company. With the prospects of reaching the original goal growing more vague every day,



Bottom pair, Theodore A. Gay, 624 78th St., Brooklyn, N. Y.; others, William Moedinger Jr.

this company leased the York & Peach Bottom Railway and for the first time the little narrow gauge trains operated over what is now the Maryland & Pennsylvania Railroad. Two years later, in 1891, the two railroads actually consolidated into one through system known as the Baltimore & Lehigh Railroad Company. The trains of passengers, mail, farm produce, slate, and milk continued to operate over the entire system between Baltimore and York and over the branch from Delta to Peach Bottom on the west bank of the Susquehanna River for only two years, and then in 1893 a very discouraging thing happened. The railroad was thrown into bankruptcy and two receivers appointed, one for the portion of the railroad in each state. Again the little narrow gauge trains operated only to and from each side of the Mason and Dixon Line.

In 1893, under the guidance of the receivers, the final independent railroad companies were organized, the companies that converted their three-foot narrow gauge railroads to standard gauge. And with both roads converted to the gauge prevailing on the railroads entering Baltimore and York, the way was paved for the final consolidation in 1901 and for the formation of the present railroad, the organization that has successfully carried the railroad through its final growth and maturity and through years of prosperity and years of ruthless competition from other forms of transportation.

TODAY Ma & Pa stands as an independent Class 2 railroad commendably furnishing efficient rail service against great competitive odds and succeeding without asking John

Maryland & Pennsylvania motive power (1940).

No.	Type	Driver Dia.	Steam Pressure, Pounds	Cylinders, D. and S.	Tractive Effort, Pounds	Weight, Pounds	Builder	Year Built	Year Retired
1	4-4-0	56″	160	17″ x 24″	16,844	159,320	Baldwin	1895	1921
2	2-6-0	56″	160	17″ x 24″	16,844	159,320	Baldwin	1895	1927
3	4-4-0	56″	160	17″ x 24″	16,844	159,320	Baldwin	1895	1920
4	4-4-0	62″	180	17″ x 24″	16,640	183,100	Richmond	1901	
5	4-4-0	62″	180	17″ x 24″	16,640	183,100	Richmond	1901	1936
6	4-4-0	62″	180	17″ x 24″	16,640	183,100	Richmond	1901	
23	2-8-0	50″	175	19″ x 24″	25,770	212,863	Baldwin	1902	
24	2-8-0	50″	175	19″ x 24″	25,770	212,863	Baldwin	1902	1936
25	2-8-0	50″	175	19″ x 24″	25,770	212,863	Baldwin	1905	1939
26	2-8-0	50″	175	19″ x 24″	25,770	212,863	Baldwin	1912	
27	4-6-0	56″	180	19″ x 24″	23,660	208,633	Baldwin	1906	
28	4-6-0	56″	180	19″ x 24″	23,660	208,633	Baldwin	1910	
29	0-6-0	50″	180	20″ x 26″	31,810	214,453	Baldwin	1913	
30	0-6-0	50″	180	20″ x 26″	31,810	216,453	Baldwin	1913	
41	2-8-0	51″	190	22″ x 28″	43,000	316,530	Baldwin	1914	
42	2-8-0	51″	190	22″ x 28″	43,000	316,530	Baldwin	1914	
43	2-8-0	51″	190	22″ x 28″	43,000	330,850	Baldwin	1925	

Gas-electric cars.

61 Built 1927 by Electro-Motive Corporation.

62 Built 1929 by Electro-Motive Corporation.

The steam locomotive need not impress by size alone. It can have beauty of proportion and line to endear itself to the onlooker, and a true connoisseur may revel alike in an old William Mason 4-4-0 or a recent Baldwin 4-8-4. The 4-4-0, old or new, is a light, fast engine, and on Maryland & Pennsylvania it still finds occasional use on passenger runs, as in the case of No. 4 at the upper left, opposite page. No. 43 is the most recent of the line's Consolidations—heavy, well built, fitted out like a hotshot 2-8-4. No. 30 is a rather ordinary example of the genus switch engine. No. 5, center, right, was one of No. 4's twin sisters from Richmond, but see what five years of solitary confinement in the junk pile has done to her skeleton! No. 61 is one of the gas-electrics which deposed the American Standards, and No. 28 is a low-wheeled Ten-Wheeler from Baldwin.

Public to replace her rails when they wear out or to regrade the fills when the Spring floods have left their mark.

Today passenger service is performed by four daily trains powered by two gas-electric cars. Each pulls one mail-express car unmistakably Ma & Pa in appearance. Each train makes a round trip daily, one leaving Baltimore, the other York, except Sunday, when only the one in York makes the round trip. The average passenger traffic is likely to run around 20,000 or 21,000 persons annually. Mail and express is the important item supporting the passenger trains. The through rider leaves either terminal and arrives at the other end of the line some 4 hours 15 minutes later with the trip on the Dallastown branch thrown in free of charge. The two gas-electrics sometimes break down or are removed from service for major repairs. It is then that the rider is privileged to ride in one of the six wooden open-platform coaches with either No. 4 or No. 6, both American type locomotives, on the smoky end.

Freight service is performed by two of the three heavy Consolidations, Nos. 41, 42, and 43. Daily except Sunday a freight leaves each of the terminals early in the morning to arrive at the other end of the line between early evening of the same day and early morning of the next day. From observation, it would seem that the portion of the railroad south of Delta sees the heavier traffic. Quite frequently last Fall it was necessary to send the third heavy engine to Delta as a helper for the southbound freight. A good deal of freight tonnage originates in Delta. If there are too many cars for the northbound freight, one of

the light Consolidations stationed in York goes to the rescue.

The motive power on the railroad consists of 11 steam locomotives and two gas-electric cars (see roster on page 13). Since the railroad was formed there have been, altogether, 17 locomotives. From 1914 to 1920 the road boasted 16 engines available for service. Since then the number has gradually decreased. The last engine to be scrapped, or rather retired, was No. 25, a light Consolidation built by Baldwin and put out of the way in May, 1939. From a railfan's point of view, Ma & Pa's motive power is above average in appearance. The freight locomotives get pretty dirty, as is to be expected; for six days each week at least two of the engines are on the road 12 to 14 hours. The passenger equipment is invariably well groomed.

In the railfan trip business, the Maryland & Pennsylvania is a veteran. In November, 1935, under the sponsorship of the Baltimore Society of Model Engineers, the first railfan excursion was operated over the entire main line of the road. A. M. Bastress, the general passenger and freight agent, agreed to provide a train for the group for the entire day, and instructed the crew to operate the train in strict accordance with the whims and dictates of the fans, providing, of course, they did not interfere with the normal operation of other trains on the line nor with required operating rules and regulations. Many years ago Ma & Pa might have handled the whole affair as a routine matter, but for a group of young men in A. D. 1935 to approach the railroad and ask for a special train simply to satisfy their interest in riding railroads sounded almost unbelievable.

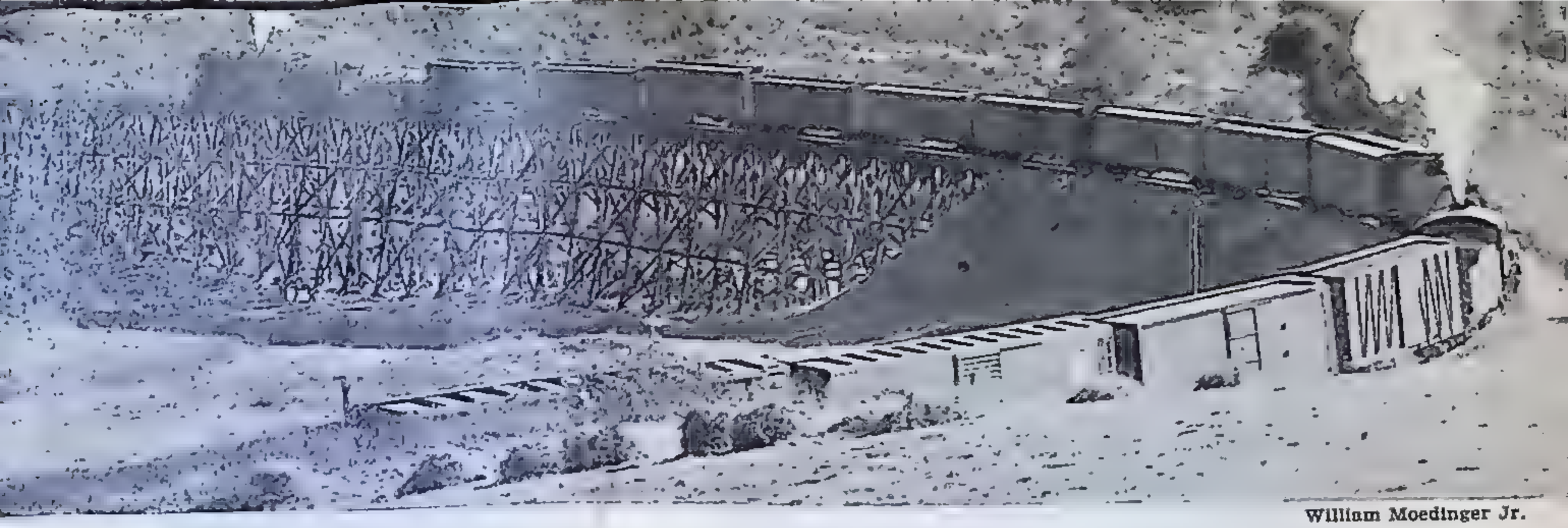
The day for the excursion arrived and the obvious preparations of Mr. Bastress indicated that he was more than casually interested in the event. The excursion proved very successful. O. H. Nance, the president of the road, joined the group and made the trip over the entire line, personally seeing that everyone desiring to ride in the cab of No. 6 had the opportunity to do so. The fans did everything but actually pull the throttle; some of them fired, others turned the switches; most of them, of course, took pictures; everyone had the time of his life. The wholehearted cooperation of the officials and employees of the railroad with the enthusiastic response of the fans justified the investment and effort on the part of the railroad. This pioneering by Ma & Pa in a new field of passenger traffic paved the way for others not only on this particular railroad but on the majority of large railroads in the country. Since 1935 Ma & Pa has operated an annual fan excursion. Some have been operated jointly with the Pennsylvania Railroad in the form of a circle tour originating in Philadelphia. On these occasions a train of Pennsy suburban coaches leaves Philadelphia behind one of the powerful GG-1 electric locomotives; in Baltimore the GG-1 is uncoupled and one of Ma & Pa's steam locomotives pulls the train to York. Once on the Ma & Pa the reason for the suburban coaches becomes obvious. The curves are too short and clearances not sufficient for standard Pennsy passenger equipment. In York the Pennsy again picks up the train and hauls it to the main line at Lancaster with steam power. From here one of the electrics handles the train for the remainder of the tour.

Unusual double header.

On some mountain lines the engines of double headers are separated so as to divide the drawbar strain, but on Ma & Pa the reason is that the trestles will not take the weight of two locomotives at once. Sometimes all through cars are placed in the first half of the train, which runs ahead for the last portion of the trip.

EVERY person who has ridden the line will agree that the trip is worth anyone's time. The average person will find the landscape along the railroad not only beautiful but well diversified. The railfan, if he strays from his mania for a second, will find the same, but the railfan will probably pay little attention to the scenic attractions about him on his first trip.

A profile of the line between Baltimore and Delta looks like a roller coaster. Between these points the railroad ascends and descends 10 distinct elevations on ruling grades ranging from 1.4 per cent to 3.3 per cent. The summits are not high, scarcely over 500 feet, but the many grades, punctuated with frequent sharp curves, call for plenty of steam and generous use of the air. Leaving Delta, northbound, the railroad descends to about 225 feet above sea level and gradually rises on a 22-mile grade to 900 feet above sea level at Red Lion. From here the line descends slightly over 500 feet to



William Moedinger Jr.

the terminal in York. Nowhere on this portion of the line is the ruling grade over 2.5 per cent, but the railroad snakes through the York County hills away from all highways except those that cross it.

Thirty-six miles of the 77-mile main line is on curves, accounting for approximately 47 per cent of main-line mileage. The engineering department of the railroad says there are 476 curves. Of this number 55 range in sharpness between 16 degrees and 20 degrees. If you're not familiar with degree of curvature, just remember that railroads rarely have curves exceeding 6 degrees on their main lines, that the Denver & Rio Grande Western on its main line through the Rockies does not have curves exceeding 10 or 12 degrees, and that this is one of the toughest pieces of main line railroading in the country today. Ma & Pa has 190 curves exceeding 10 degrees. From the air a 15-car freight train on this railroad looks like a snake making its way through the grass. One has little difficulty visioning it as a former narrow gauge pike.

On Ma & Pa's 80 miles of railroad are 114 bridges totaling 11,155 feet in length. The majority of them are of the wooden trestle variety. When the railroad purchased the first two heavy Consolidations, the wooden bridges were reinforced with steel I-beam stringers. The majority of the wooden bridges take the place of fills, and if the road were being built today the total number of bridges would be reduced materially. Main line track might be classed as unusual for a railroad of its size. Of course the track does not have the precision and smoothness of high iron laid with 152-pound rail, but considering the fact that the rail on no portion of the line exceeds 90 pounds per yard, the track does look as though the maintenance-of-way department takes pride in its work. Even in mid-Summer the absence of weeds is immediately noticeable.

Despite the restricted budget, the company spent more than $120,000 in 1939 for improvements to roadway and structures. In the same year Ma & Pa witnessed the smallest passenger traffic in its history; scarcely over 21,000 persons paid fares. There was a very slight increase in freight tonnage for the year. But with traffic in general very close to that of the previous few years, Ma & Pa managed to con-

Know your railroads.

Do you know the home roads of the freight cars by their reporting marks? It's a good game to outwit your friends and to show the wife how smart you are. As a starter, try yourself on the following train of cars. The initials are the reporting marks as assigned by the A. A. R.; some of them are tricky, so don't be surprised if they are tougher than they look. Twenty out of the 39, guessed correctly, is really a very good number for anyone. Guess 35 and you are an authority. Below five, you should read TRAINS more often. Answers on page 38.

M-K-T	GM&N	TRRA
RDG	ACY	DL&W
WM	B&LE	OK
B&O	CC&O	GTW
A&WP	LV	NKP
BM	PRR	ATSF
IC	V&T	BAR
I-GN	RFP	CP
NH	AA	FW&D
SDAE	B&A	M&PA
SPS	C&S	P&PU
CNW	BAP	THB
ACL	EJ&S	SOO

William Moedinger Jr.

Maryland & Pennsylvania is not an airline.

The 77-mile main line has an average of more than six curves per mile. Seldom can one see such a photogenic example of a reverse curve as that on the opposite page. After two more miles of such twists the train will be in Fern Cliff, Md., only a flagstop and not even a postoffice. Such bucolic surroundings may not be of as much interest mechanically as the fast stepping traffic of a Class 1 main line, but the scenery is unmarred and enjoyed even by the crew of the afternoon *Baltimore Mail*, above, climbing out of Muddy Creek Valley toward Delta with all hands admiring the autumn foliage. Notice the guard rail, often needed along a line which cannot be used by standard length main line coaches.

vert the deficit of the previous years into a profit of 65 cents on each of the nearly 20,000 shares of stock. This achievement might well be studied by some of the larger systems, especially when it is remembered that it was accomplished without eliminating one train at the expense of the public and without deferring necessary expenditures and improvements to roadway and equipment at the expense of the railroad's future.

Inasmuch as Ma & Pa has lost practically all of the local and l. c. l. freight to the trucks, her freight business is made up of carload traffic interchanged with other railroads. In Baltimore Ma & Pa has direct interchange tracks with the Baltimore & Ohio and the Pennsylvania Railroad. She also interchanges freight indirectly with the Baltimore & Annapolis Railroad through the B&O and indirectly with the Western Maryland Railway through the Pennsylvania. In York Ma & Pa connects with the Pennsylvania and indirectly with the Western Maryland Railway (via Pennsy).

The shops and car storage yards are located in Baltimore, and all general and major re-

Yearbook.

Worthy addition to anyone's library is the 596-page handsomely bound, thoroughly indexed volume of the first year of TRAINS. A copy is yours for $4. A library binder for 12 loose copies will be ready soon at $2 each postpaid.

William Moedinger Jr.

pairs are made at the roundhouse there. The facilities in York are only sufficient for the servicing of the two locomotives permanently in service at that end of the line. One of the 0-6-0 yard goats and one of the light Consolidations handle all of the yard and interchange work in York. No. 4, a 4-4-0, is stored in the three-stall cinder-block engine house to substitute for the gas-electric in case of an emergency. The steady decrease in passenger traffic has reduced passenger equipment to six coaches, three combination mail and express cars, and two combination milk and baggage cars, all of which are of wooden construction. The company also maintains, in addition to a complete wreck train, several pieces of passenger equipment for work and roadway use. All of the company-owned rolling stock for the past several years has been confined to local service only, and will never be seen again in the trains of other railroads. And as the years go by there will be less likelihood of this rule being altered; interchange rules are becoming more rigid every day.

But we can still see the old rolling stock and the smallish locomotives along the line. We can see the sharp curves, some of them nestling in deep slate cuts which chipped paint off the sides of gas-electric No. 62 on its first trip. We can ride past the small town depots, many of them also used for other purposes, such as stores or gas stations, so as to help revenue. We know this is a different trip even before we board the train, so let's take the *York Mail* from the inconspicuous Baltimore terminal some morning. What a ride! What a railroad!

R. V. Nixon, 319 N. 3rd St., Livingston, Mont.

Oldest of the Northern transcontinental railroads.

Northern Pacific, with its 6682 miles stretching from Duluth and the Twin Cities to Seattle, Tacoma, and Portland, was the second of the transcontinentals, first by the northern route. The line to Tacoma via Portland was finished in 1883. NP is a big railroad and a varied one. It hauls ore and coal, wheat and lumber, silks and oils from the Orient. Until two months ago it owned the world's largest locomotives. Here is but a taste of it, photographically. The local passenger train is No. 221 between Logan and Trident, Mont. The engine is one of NP's sleek Pacifics, and the freight is eastbound nearing Livingston, Mont., with Livingston Peak and the Absaroka Range in the background.

Wesley Krambeck, 4406 Belleview, Kansas City, Mo.

E. R. Augustin Jr., 416 S. 5th St., Livingston, Mont

Railroad Photography

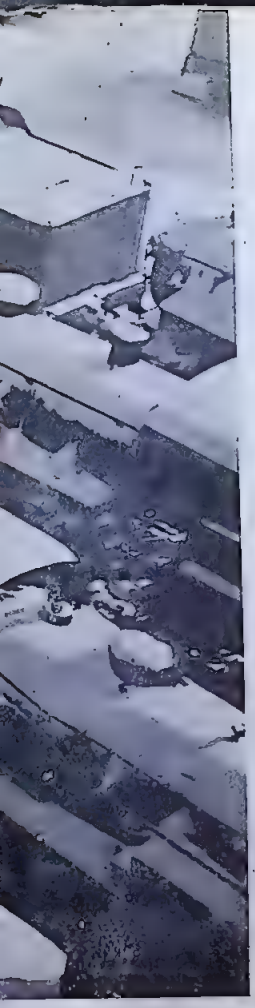
By Linn H. Westcott.

THE desire of most photographers interested in good railroad pictures is to capture the atmosphere that makes the railroad a living thing. As Noel Hiram Deeks puts it, "I'll shoot anything that looks, tastes, or smells of railroad. Unfortunately there are some things you just can't photograph: the wail of a whistle across the still night air, the blinding glare of a headlight and the trembling of the ground as a locomotive flashes by in the night leaving the smell of hot engine oil and steam and pungent soft coal. . . . Go ahead and photograph that—I dare you!

"But you see my point. I want to capture a bit of the tremendous power, the massiveness, and the terrific speed with pictures."

There is the challenge to the photographer and railroad minded alike. Many persons, perhaps several thousand, have already become really expert in capturing their favorite scenes, yet the field has been barely scratched.

Of these personalities (it's hard to mention a single name without omitting a hundred equally able) there is a large group of photographers who have done wonders in the photogenic Colorado region. We can start in post-Civil War days with William H. Jackson, who was not truly a railroad photographer alone, for his pictures of the Yellowstone Basin were largely responsible for the making of that national park. Jackson took publicity photographs for the Denvre & Rio Grande and other Western railroads which have rarely been surpassed. His younger friend, L. C. McClure, was an official railroad photographer in the days of rapid Western expansion. McClure



Linn H. Westcott.

Locomotive cemetery.

Peacefully these engines of years past rest beneath the clean snow. Perhaps they are doomed to junk. Bigger, more efficient machines have pushed them to the end of the list. But they are not as decrepit as the casual onlooker may think. Let blizzard or boom sweep over the railroad's land, and roundhouse crews will put them under steam with astonishing facility.

On the back cover.

The water spout on the back cover is only one of many excellent railroad atmosphere pictures by Noel Hiram Deeks, assistant to Edward Steichen. Deeks uses a Rolleiflex, always with a lens shade, checks exposure with a Weston meter, and uses a tripod for anything slower than 1/50 second. He takes few railroad shots now, mostly because the only railroad nearby is electrified, and "about as exciting to me as a mud pie." Like most other railroad photographers, he likes smoke and steam in his pictures.

still supplies fine 8" x 10" contact prints from his beautiful negatives of winding narrow and standard gauges in the heart of the Rockies.

Otto C. Perry is a Denver mail carrier whose pictures have a distinctive railroady flavor. His shots of the narrow gauge railroads are among the finest records of these fast-dwindling bits of romance. The work of other well-known Colorado cameramen have appeared in TRAINS' pages many times.

In Los Angeles is Gerry Best, who has just completed his roster of the locomotives of the Southern Pacific. Best's collection is among the most complete of Western locomotive pictures. In Sacramento, D. L. Joslyn has spent a number of years building up a fine group of photographs of Californiana. Part of his collection of old prints and reproductions from stereos of the building of the first transcontinental railroad are scheduled to appear in TRAINS next May.

Pictures of modern trains at speed by Lucius Beebe, New York *Herald-Tribune* columnist, have been published in three fine volumes. Beebe's pictures are highly condemned by some railfans as lacking of detail, and highly praised by others for their artistic merit and the way in which they bring action to the printed page. On these pages and in other issues of TRAINS are pictures representative of the fine work being done by more of the many capable rail photographers.

Most amateur railroad photographers prefer to trade their pictures with others by mail, yet are always willing to sell prints for little over their actual costs to those who have few to trade. In this way it is not unusual to find collectors with 25,000 different prints, only a fraction of which are from their own cameras.

Originally the railroad picture movement concerned itself almost entirely with record views of locomotives standing still and located so as to show the side rods clearly, together with the engine number and road name. These locomotive pictures, usually postcard size, have been collected for so long that nearly complete rosters of all the major railroads and most of the small lines could be made up if all the collectors were to get together. The missing links are locomotives no longer in service which were too elusive to get on the record. Fans who take locomotive photographs usually write the specifications and other commentary on the back of their prints. They often specialize on favorite railroads or special types, but more about this later.

A few of the up and coming collectors have organized their material in albums to tell a development story of the railroad in which they are interested. Besides the engine pictures they include illustrations of all phases of the railroad's activity, maps, etc.

While engine pictures were growing in popularity a new kind of railroad photography, pictures of trains at speed, was made practical by improvements in photographic film. A locomotive, plus its train, plus action and plenty of it, was the new idea. Speed shots are difficult because they require almost perfect coordination of timing and light. Rare is the photographer who does not waste a great amount of film because he trips the shutter much too soon as a train ap-

Linn H. Westcott, 1362 N. 39th St., Milwaukee, Wis.

proaches. It may take months of practice to learn to wait until the engine seems to be almost too near before making such an exposure.

The next step in complexity was the addition of a scenic setting to the speed shots. In almost every locality there are places where the tracks make beautiful sweeping curves, or the backgrounds are scenic. Here is the ideal stage for a train at speed. Get up on a bridge or embankment or down at the track level and you may produce a really dynamic picture like some of those on the following pages and in each issue of TRAINS.

Many Possibilities.

While to many of us scenic action pictures are the last word, there are still other fascinating possibilities in the railroad picture field. Many a fine picture has been taken of railroad scenery without a train in sight, as the pictures on pages 22, 24, and 29. Pictures of railroad bridges, stations, water tanks, fancy trackwork, and closeups of details of a railroad nature all have excellent possibilities. Many a good collection could be made by picturing only items of ancient origin such as the old order boards found on branch line signal towers, the stones of the Allegheny Portage Railroad still imbedded in the earth after nearly a hundred years of neglect, the station buildings built in the eighties and nineties still serving many an American city, stub switches, *et al.*

Not to be underrated are the excellent opportunities in documenting the way a railroad is run, its people and how they work: how a yard man throws a switch or rides the ladder on a car, how the operator writes out his train orders, and even how the city passenger agent goes about his work.

Cameras and Equipment.

Strictly locomotive pictures are usually taken with postcard-size film or enlarged to that size from other smaller formats. For the scenic and record pictures there are no size requirements, but one can do a bit better on quality if he avoids the film sizes smaller than 120 or B-2—not that the small film won't do the work, but it requires expert care to maintain the best tone qualities and avoid blemishes.

Also popular for locomotives is the 116 size because it is long for its width. For general photography the size is very awkward.

Lonely country bridge.

But the lonely, quiet scene is right in the heart of a big city, within feet of the main hump yard and with shops and roundhouses nearby. A photographer has crossed his Rubicon when he can make unusual pictures out of common, easily available material. Like many a large city, Milwaukee has been crossed and recrossed by railroad lines which changed their routes with growth and consolidation, and this little bridge, now carrying a yard track, was once on or near the main line of the Milwaukee & St. Paul Railroad, since 1872 part of the Milwaukee Road. Linn Westcott is an ex-professional photographer who finds editorial work on TRAINS more interesting. He has a background of railroad engineering; has traveled widely, specializing in Western lore.

C. E. Parker, 45 Warren St., Newton Centre, Mass.

New Haven local.

Near Sharon, Mass., on the main line of the New Haven from Boston to Providence, Pacific type locomotive No. 1301 wheels a six-car local smartly along. Many a good train photo is made on a snappy Winter day because cold makes the steam more evident. Notice the semaphore blades pointing toward the left, just the reverse of standard practice. A two-arm signal usually indicates an interlocking.

The writer uses three cameras for his railroad pictures, most often a Korelle Reflex, using Agfa Superpan-Press film, size B-2 or 2¼" square. This camera is handy, easy to operate, and gives good quality negatives for enlarging. The 1/500-second shutter speed does fairly well but needs occasional adjustment. Equally good are the Rolleiflex, Rolliecord, and Zeiss Super-Ikonta B cameras. Any one of these four would be my choice if I could have only one camera.

Folding cameras of the 120 size are more in the range of the average pocketbook, and almost all makes are good. Perhaps half of the pictures contributed to TRAINS are taken with these handy instruments, which can be carried on any trip with ease.

I also use a Linhof, 9 x 12 centimeter, and a Contax III for railroad pictures. The Linhof is on the order of the well-known Speed Graphic, but with many added features (which add to the cost, of course). It is the camera I use when I plan a picture ahead of time. It is never without a tripod and the ground glass is always used for focusing. In common with the old standard, the view camera, it has a swinging back which makes it possible to keep both the engine and caboose in focus at the same time, a very useful feature.

My Contax is used mostly for colored pictures to be projected upon a screen, although the pictures on pages 20 and 22 were also made with it. Its 1/1250-second shutter speed will stop the *Super-Chief*. Dick Kindig, of Denver, proves with his 35 mm. camera that a high priced camera is not necessary to get good color photos, and what's more, he has the uncanny knack of getting perfect Kodachromes without an exposure meter.

Light.

Most important in railroad photography is light. Don't be afraid of dull or rainy days. Those are the best times to get pictures showing the detail 'way under the boiler of an engine. Perhaps the most favored light for scenic pictures is just after sunrise or just before sunset, when all the railroad world becomes an enchanted empire of smoke and action.

Summer mid-days are often the hardest times to get good pictures close up, so get back and put a bridge into the scene, or take one of those hard-to-get views of a train several miles away running across the horizon.

L. C. McClure, 2128 Glennrm Pl., Denver, Colo.

Loop on the old Moffat line over the Divide.

Until the six-mile Moffat Tunnel was first used in 1934, trains of the Denver & Salt Lake Railroad crossed the Continental Divide at Corona on Rollins Pass, 50 miles northwest of Denver. This was the top of the world for United States railroads, elevation 11,680 feet, a tortuous, winding, almost perpetually snowbound route which was a pain to operating men and red ink to the front office. Now it is all gone. The photo shows part of the loop on the old line. Track in the foreground curves around to cross the trestle over Gunsight Notch in background. It then loops to come toward the photographer through tunnel below the same trestle. The photo was taken with an 8″ x 10″ view camera, which, with the low light, accounts for the sharp detail. L. C. McClure, who has about the finest collection of old Colorado railroad pictures, learned his art from William Jackson, famous photographer of post-Civil War days.

Light from behind the subject will give a dramatic effect if it is handled well. See the examples on pages 2 and 29.

Time.

As for season, Winter is favorite with many photographers because the sun is low and the steam makes beautiful patterns as it vaporizes in the cold air.

If you have no idea how to ascertain when a train may pass your favorite setting, look up a passenger train in the timetable of the railroad concerned or ask the nearest station agent. He will be able to tell you of suburban locals not listed in the general timetable. Freight trains often run irregularly, but constant observation will help you get an intuition as to their running habits.

Also under the category of time comes shutter speed. Many pictures will give no trouble at 1/100 second, particularly if you are not too close to fast action. Action coming toward the camera is easier to stop than a side view, and even a box camera can be used for head-on shots. If you are fortunate enough to possess a camera with 1/500- or 1/1000-second shutter speeds, action can be stopped more easily.

Don't let this lead you to believe that train action must be stopped, however. Look at the

A. C. Kalmbach, 4924 W. Woodlawn Ct., Milwaukee, Wis.

Hiawatha out of Milwaukee in two sections.

Snuggling right in the heart of downtown Milwaukee is the Milwaukee Road station, one of the most conveniently located American depots. Its nineteenth century tower looks down upon a small wooded square and across to the busiest stores and office buildings of the city. Across the street is the main interurban and bus terminal. But it's behind the station that railfans like to gather, especially on warm Summer afternoons, when two or more *Hiawathas*, a *Chippewa*, Madison express, and a protection engine returning to the roundhouse all pull out westbound within 15 minutes. Downtown buildings form a backdrop for all this activity. The eastbound train in this photo is an American Express Banner Tour special, and a thin spray of steam reveals the *Chippewa* hiding behind the first *Hiawatha* coach. A. C. Kalmbach, editor of TRAINS, uses a Korelle Reflex for his occasional camera work.

picture by Willard V. Anderson on page 33. Here the blur caused by a slow shutter definitely adds speed to the picture. It all depends upon the effect you wish to make.

Perhaps more important even than shutter speed is the use of a tripod. Nuisance that it is, a tripod will save you lots of film and keep your quality high. Use it whenever you can. Exposure meters also save their cost in a few hundred pictures, and, if you take pictures closer than 25 feet, get a range finder to measure for your focus. One well-known teacher advises his students to buy the exposure meter and range finder before getting a camera, so that when picture-shooting begins it will be easier for the neophytes to get good negatives.

Angles.

Angles make modern railroad photographs. Shoot upward at the smokebox front, headlight, and stack of almost any locomotive and you can't miss a good modern subject even though it has been done before. Shoot along the side rods, or stand in a cattle car and get scenery through the cracks in the boards. These are angle pictures; the best of them make the Sunday roto-sections and the pages of TRAINS.

Angles are important in more normal pic-

Station Stop.

Northern Pacific's North Coast Limited making a depot stop at dusk in Wadena, Minn. The twilight sky silhouettes a restless locomotive while the cars are illuminated by the platform lights. The photo is by Leslie Fox of the Wadena Pioneer Journal.

Henry Griffiths, 1316 River St., Boise, Ida.

Train into tunnel.

A tunnel mouth makes an appropriate frame for Union Pacific 4-8-2 No. 7083 pulling the second section of the *Portland Rose* eastbound a few miles east of Boise, Ida. Photographer Griffiths says the only thing he was afraid of was that the enginemen might see him and stop the train. At this point Union Pacific's line follows the Snake River Valley and the tunnel cuts through a foothill ridge. Some 100 miles east is tourist attraction Shoshone Falls, and several hundred miles north is the wildly beautiful but little explored Snake River Canyon.

tures too. To make a locomotive look enormous, get down at the rail level, toward the front and as close to the engine as your camera will permit. The result will be like the photo on page 16 of April 1941 TRAINS. To further the effect, have a rather good-sized print made of all pictures you take close up. A small print gives the viewer a false perspective.

Many railroad photographers using small negatives have enlargers as part of their equipment and seldom make contact prints. The use of an enlarger also affords the opportunity to "dodge" the print to bring out detail which would be lost in straight printing.

Side views usually make a locomotive look smaller but often bring out the great length of an articulated. A good side view of a train in action is much harder to get than three-quarters or head-on pictures, so there is another challenge.

Photographer's License.

In this country we still have many of the rights we were born with, including the right to take pictures of anything that will not joepardize society. But on a railroad right of way a wise photographer respects the rules of the railroad. Those most likely to affect him are safety practices: Never step on a rail; step over it. If a crew invites you into the engine cab, enter and leave by the ladder with your face toward the engine. Always keep your mind on the moving equipment in a yard and don't let a rolling car sneak up on you. Whenever possible take your pictures from a safe

Cinder man.

Sleet coats telegraph wires and station platform alike this morning and the station agent must be out sprinkling the platform with cinders before the 7:58 picks up its crowd of commuters. Safety is of the first importance in railroading, and safety means constant watchfulness by the employees who tend the railroad's property as well as by trainmen. Photo was taken directly into the hazy sun and with fast shutter speed and small stop.

Linn H. Westcott.

distance off the tracks. If you promise to give the crew prints of the pictures you take, keep the promise so the next fellow will receive the same courtesies extended to you.

War restrictions may keep you out of many a railroad yard or junction, especially along the Eastern seaboard. Always ask permission first to save embarassment later.

Pictures in Trains.

TRAINS, like most magazines, spends considerable time and study in choosing illustrations for each issue. There must be photos to illustrate every story, there must be one picture or drawing on every pair of pages, and the magazine requires a large number of photographs that can stand upon their own merits with little or no printed material.

Our photos are mostly contributed by our own readers. For every photograph we publish we must have nearly a dozen to select from. Although only one of these may appear in print, the others are necessary to provide information for the caption material, and they may be used in their turn in a later issue.

Take the Tintic, Utah, story on page 38 for example. The photographs chosen to illustrate the material were only three from a number of possibilities. These three surpassed the others in that they told the most about the railroads around Tintic, and they were sharper, had better tone quality, and were supplied to us in large sizes. The head-on view of the Mallet was one of two almost identical shots taken by Kindig and Maxwell at the same time. The print used was better because the

Donald W. Furler, 65 Glen Ave., Glen Rock, N. J.

Erie and Lackawanna by father and son.

Donald W. Furler likes railroads and has always liked railroads as far back as he can remember. That's why he takes pictures, not as a photographic hobby but as a means of perpetuating on paper the scenes he likes. It all started with engine pictures, grew into a specialty of action photos like that of the *Erie Limited* above. Sometimes his father, Charles, goes along on picture taking expeditions with creditable results like the shot of the Lackawanna Sussex Branch freight (next page) climbing the grade from Andover, N. J., to Cranberry Lake. Camera is a 5" x 7" Speed Graphic, which gives the best combination of depth of focus with size of negative suitable for fine detail. Furler has used a 4" x 5" Speed Graphic, in his opinion excellent but not quite large enough negative for detail, and an 8" x 10" view camera, fine for soaking in the detail of a standing engine but of course out of the question for action pictures.

locomotive was nearer to the camera, yet not too close to cut off all foreground.

As to tone quality, there is a mistaken idea among many photographers that prints for publication should be very contrasty. Such a print usually reproduces poorly because the gray middle tones are too few and meaningless. Try to print your pictures (if you do it yourself) so that the darkest item of any importance is just black yet unquestionably not gray. At the same time choose a grade of printing paper so that the lightest point of importance, usually the sky, is not quite as white as the borders of the paper. Locomotive pictures should show all the detail you can see in the negative. If the running gear is a muddle of blackness, toss the print into the waste basket and try again.

Fine-grain developing, useful as it is, has spoiled hundreds of otherwise good pictures mainly because the developer may lose life faster than the user realizes. The resulting films look good, but print out only with great difficulty and loss of quality. For reproduction a coarser grain makes trouble only when the final picture on the printed page is very much larger than the negative, a rare case.

It might be well to mention that many of the locomotive picture specialists have set rather high standards for their work. Besides utilizing the postcard-size print (or larger), they always try to get pictures of locomotives from the side with the side rods in their lowest position to show the best detail. The side of the locomotive with the greatest amount of accessory fittings is preferred, usually the right side

Charles Furler, 65 Glen Ave., Glen Rock, N. J.

where the power reverse gear is located. To be safe both sides are recorded if the light permits.

A collector specializing in a particular railroad will try to get a picture of every class first; maybe later, every locomotive. Take the Milwaukee Road for example. First you get pictures of each existing class in your own territory; you trade for pix of classes hard to get. Later you'll take a vacation trip and track down a lot of those rare items, to your wife's disgust. Milwaukee's best passenger engines are the F-7 class. One photo of each side will satisfy you that you have bagged the class at first, but later you'll discover all F-7 engines are not alike. If you don't believe it, compare the front ends of the two locomotives in the picture on page 25. So you start the endless task of getting all the locomotives on the road.

Technique.

I believe good printing is most important in railroad photography. Simplify your negative processes, avoid fine grain except with well standardized developers, and develop a little longer than normal for railroad subjects on dull days and for locomotive pictures.

In printing I use a developer that permits long or short development depending upon desired results,* in combination with Brovira enlarging paper. I keep a tray of clean water handy, putting the developing print into it to force sky detail without greatly increasing the black densities.

* We'll gladly send formula for three-cent stamp.

Frank Quin, Railroad Enthusiasts, New York Division.

Summer and Winter on the Boston & Maine.

The same scene photographed in Summer and Winter makes a good photographic pair. Frank Quin picked the view showing junction of B&M Troy and Mechanicville lines from JV tower at Johnsonville, N. Y., and in the Summer scene posed the *Minute Man*, Troy to Boston passenger job, in the Winter scene freight train TE-2 from Troy to East Deerfield, Mass. Quin works for the New York *Daily News*, takes railroad photos with his 2½" x 4¼" Kodak purely for record purposes, and claims he is merely the kind of camera fan who enjoys making little contact prints and hoping someday to have an enlarger. Right now war restricts picture taking around New York terminals, so Quin sticks to action shots out along the line.

Frank Quin.

On the Lackawanna.

Day train of the Delaware, Lackawanna & Western Railroad between Jersey City and Buffalo is the *Lackawanna Limited*, normally routed over the heaviest stretch of railroad construction work in the world, the Lackawanna cutoff through northern New Jersey. But this day a landslide blocked the cutoff and Robert Collins bagged the crack flier on the old line near Hackettstown. Collins once specialized in engine pictures, but has come to like speed shots best, perhaps because they are more difficult and uncertain.

Robert F. Collins, 16 Lee Ave., Glen Rock, N. J.

Breezing in from the golden West.

Action shots of Diesel power are often lifeless compared with pictures of smoke-belching steam-powered trains, but here a combination of evening light and slow shutter speed conspired to give the front end of this Burlington *Zephyr* just enough of a blur to show its speed as it whisked eastward from the setting sun. Taken with a folding camera and Eastman Super-Sensitive film, *f*. 6.3, 1/50 second, by one of the editors of TRAINS.

Willard V. Anderson, Route 3, Box 238-D, Waukesha, Wis.

Vestige of an empire.

Colorado & Southern narrow gauge engine No. 70 champs through Ridge, Colo., 10 miles from Denver on the vestige of the one-time Colorado Central, which hauled ore from the mines that made Denver great. This was the line that once went to Central City and Silver Plume and included the famous Georgetown Loop. Jack Thode, who took the picture, is a D&RGW employee, one of the very few railfans who work for railroads.

Jack C. Thode, 2351 Forest St., Denver, Colo.

The Railroad Treasurer

★ Handling a railroad's money is as big a job as handling its cars and locomotives.

*By Edward Hungerford.**

THE financial officer of the railroad is, of course, the treasurer. It is he who receives its earnings—running possibly into a hundred million dollars in the course of a twelvemonth—and disburses them for supplies and for wages, for taxes and for bond coupons, and, it is to be hoped, for dividends. He works through appointed banks, and the bank president who can go out and capture one or two good railroad accounts for his institution has earned his salary for several years to come. The selection of the banks is one of the dramatic phases of the inside politics of railroading; it is a cause of constant wire-pullings and heartburnings.

"Do you see that whited sepulchre down there?" a big railroad head laughs to you as he points to a white marble skyscraper closing the vista of a city canyon. "This road built that temple of business. Our account is its backbone. Sometimes we deposit a million dollars a day and it is no uncommon thing for our balance there, approaching coupon or dividend times, to reach 16 or 17 million dollars."

He laughs again, then grows confidential.

"We're in a bit of a hole," he admits. "Some of the big manufacturers downtown are organizing a bank, and it looks as if it were going to be a pretty solid sort of institution. They want a big account from us, and our traffic people are urging their cause. In the long run they'll get the account."

Then he explains to you that the railroad endeavors to hold down its bank accounts, although it must have them in a large number of different cities to avoid the long shipments of large quantities of money. The agents and the conductors will, following a carefully arranged system, send their receipts to the nearest designated banks, mailing memorandum slips of the deposit both to the treasurer and to the comptroller. The bank, in its turn, sends receipt slips to both of these officers, so the deposit transaction is hedged about with a sufficient degree of formality and detail.

When it comes to pay out its money, the railroad has no lessened degree of formality and detail. For the wages of its employees—generally the greatest of all expenditures—the railroad has proper system and order. The paymaster makes out the voluminous payrolls, they are each properly attested by the heads of departments, and for his payroll totals the necessary vouchers are issued to him by the treasurer. He may pay the railroad army by check or he may send his deputies out over the system in pay-cars.

The pay-car is one of the pleasantest of the surviving old-time railroad customs. The shriek of the whistle of the engine that hauls it is the most welcome melody that can come to the ears of the man along the line. To shuffle in a long line up to its platform window where the railroad's money is being paid out in tiny envelopes, as each man signs the impressive roll, is one of the greatest joys that anticipation can hold out. As the car makes its routine trip over the line each month or each fortnight, it draws its money from the various repository banks, or else the cash is forwarded to it at division points from headquarters.

But like many old customs, the pay-car is disappearing. The railroads are more and more paying their men by check. It is a better system in many ways. It avoids the handling of large sums of money, and many of the men prefer not to have a roll of bills thrust into their hands. The old prejudice among them against checks is practically over. The checks are constant incentives toward saving; the small banks in the little towns are shrewdly reaching for the accounts of the thrifty railroaders. There may not be

* Specially revised for TRAINS by Mr. Hungerford from his now out-of-print book, *The Modern Railroad.*

Section of the New Haven's purchasing department.

The railroad purchasing agent must buy everything from toothpicks to locomotives. Consider that the railroad runs large offices, a chain of moving restaurants, factories and shops as a means to its primary business of transportation, and you will see why the purchase of supplies and equipment is so important.

much for the bank in just one of these accounts, but they can quickly multiply into considerable sums.

We have already mentioned the comptroller; he is called the auditor on some of our railroads. The comptroller is the most passionless and unemotional of all railroad officials. He measures the worth of his fellows by cold mathematical rules, by addition, by subtraction, by multiplication, by division. Even as big a man as the president may shudder at the result of such coldly accurate measurings.

No moneys are received, none spent, without the knowledge and approval of the comptroller. He is really a fine balance-wheel of the system, a governor working in exact accord with the laws of the ancient and wonderfully accurate science of numbers. By his computations men rise, men fall. He is the keeper of the rule and keeper of the weight.

His office organization reflects his own measure of accuracy. As a rule, an auditor of disbursements and auditor of tickets and of freight receipt reports are his chief assistants at headquarters. A corps of sharp-eyed young men, each also having an almighty respect for mathematical accuracy, will be up and down the line for him, catching up careless agents on the one hand, and on the other gently showing them how to keep their accounts better and how to conform more carefully to the company's established standards. Sometimes the car accountant, a man who watches the mileage of the company's cars traveling over other roads, and the equipment of other roads scurrying over the home system, reports to the comptroller—oftener, however, directly to the operating department. All these make a considerable office—an office which usually treads its monotonous path and rarely becomes nervously excited; an office to be well considered in the organization of the railroad.

The work of that office falls quite naturally into three channels, as we have already indi-

cated: passenger receipts, freight receipts and disbursements, and general accounts. In the passenger receipts the accounting has, of course, to do with the sale of tickets, and the cash fare collections made by conductors upon the trains. This would be simple enough bookkeeping if a good many years ago the interline or coupon ticket, entitling the bearer to ride upon several different roads, had not come into popularity. To apportion the revenue of a ticket between the half-dozen different lines upon which it has been used requires almost no end of system and accounting. Once a month each road has an accounting with its fellows with whom it is engaged in selling through tickets. The coupons themselves are the vouchers, and cash balances of a single road—because of the freight as well as the passenger business—may be kept standing in the treasuries of several hundred other roads. It is a system quite as intricate, in itself, as the relations between city and country banking, and yet it is only a single small phase of the conduct of the railroad.

The auditor of ticket receipts must also, through this staff organization, make sharp examination of the tickets that are turned in by the conductors at the end of each day's run. He must see to it that the conductor is neither careless nor anything worse. In either of these cases he will bring the matter quickly to the attention of the operating department.

Do you wonder then that the comptroller sometimes grows gray-haired, that the vast routine of his office swells tremendously from year to year? The passenger receipts are almost always less than half of the income accounts of his offices. They are the *A, B, C* compared with the delicious tangle that comes when the freight waybills come in by the hundred thousand, and each little road must receive the last penny due to it. That feature alone will sometimes keep 400 clerks busy at accounting machines and typewriters in a single office; will involve many, many more balances and cross-balances between the railroads.

And beyond that complication is still another, the constant investigation and settlement of freight claims that come pouring in against the railroad. There is another job for a staff of competent men. If it is an overcharge claim, the routine is comparatively simple. The audit office should have information at hand sufficient to decline the claim or settle it immediately. But if the claim is for lost or damaged freight, the thing complicates. Before the freight claim department will draw a voucher against the treasurer, it will have to assure its own conscience that the claim is fairly substantiated by the facts.

From the freight and passenger receipts, combined with those from rentals of express or telegraph privileges or the like, the railroad pays its bills—pays its men, as we have already seen. It pays its taxes and its bond coupons and its fire insurance, and apportions these as far as possible over the 12 months of the year that it may keep a fairly even balance between receipts and expenditures. The other bills are paid by properly signed and attested vouchers, which are bankable like checks, and which are indeed the very best form of check, because they are upon their face a receipt stating the precise reason for which a certain sum of money was paid.

In recent years the comptroller, or the

SP comptometers.

Calculating machines are as much a part of the Southern Pacific's business as its much better known cab-forward articulateds. Hundreds of them are needed to prepare not only accounting reports but the operating reports on which modern efficiency is based. This view shows only a portion of the San Francisco comptometer bureau.

auditor, as you may prefer to call him, has become more and more of a statistician. He prepares tables as to locomotive performances, obtaining his figures from the mechanical department; he can tell you to an ounce the average carload of the system for any given month. He fairly seems to revel in his own development of the science of numbers. Train and car statistics will probably show the number of trains of different classes, the mileage of the same, the mileage of empty and of loaded cars, and the direction of their movement. Locomotive statistics run to mileage, consumption of fuel and of stores, and the cost of labor and material for repairs. In addition to all these the comptroller will probably prepare statistics of locomotive efficiency—so many miles to one ton of coal and one pint of oil. Then he will show the average cost of coal by the ton and of oil by the gallon, for the railroad never forgets the cost.

It is cost that really makes the excuse for these great statistics; cost and revenue, analyzed and reanalyzed in half a hundred different ways. The statistics are the thermometers, the very pulse by which the health of the railroad is acutely judged. Sometimes the statistics become graphic, and the comptroller, through some of the keen-witted men in his office, prepares charts in which statistics become "curves of averages" or jotted and wriggling lines, with each jot and each wriggle full of meaning.

"Government by drafting-board," sniffs the old-time railroader as he sees these great "cross-hatched" sheets with their crazy lines of intelligence spun across them, but it is "government by drafting-board" that has made the old-time railroader—well, the old-time railroader. The new-time railroader gives heed to those charts, the pulse readings of the creature that he is directing—guides his course in no small way by them. They are veritable charts by which he may pick his way quickly and safely.

Branching, as a rule, direct from the president's office and occasionally from the general manager's, are the purchasing agent and the storekeeper, many times one and the same, or the former acting as superior to the latter. The purchasing agent has no easy role. If he is not above sharp practices—the gift of a bit of furniture or a theater box, in the least instances—he will fulfill only part of the reputation of his office; and if he is—as many, many of them are—absolutely honest down to the keenest degree of an acute conscience, he will probably still be under the suspicion of some querulous minds. His opportunities for deceit and guile are many; so much the more must he be an honest man in every sense of that word.

He brings the modern railroad's passion for standardization down to the purchase of its every sort of supplies, for his office goes out into the market for anything, from a box of matches to a locomotive. The very fact that his department is a non-revenue department, save for an occasional sale of scrap iron or discarded materials, only serves to put him the more upon his guard. He must not yield to the wiles of crafty salesmen. He must measure their wares by a single standard—economy, as expressed in selling price, in durability, and in cost of maintenance; and upon that standard he must decide between them, as impartially as a justice upon the bench.

He must be guided by standard. If it be typewriters, he must struggle against the preference of this department or that for some particular machine, and bring all to the test of his three-headed economy. The successful machine will then be adopted for the system and bought as such. No small responsibility rests upon his accuracy of judgment.

His storekeeper must see to it that there is

Sorting passenger tickets.

First step in the complicated accounting of passenger receipts is the sorting of tickets and coupons collected by conductors. Tickets sold on the line must be checked against ticket sale reports of the stations selling them, as indicated by the stamp on the reverse side, and coupons sold by other lines must be presented to those lines for payment of a sum determined by reciprocal rate agreements.

no waste of supplies. He must see to it, for instance, that the engineers are as careful in their use of oils as the clerk in that of stationery.

"We use $4,000 worth of lead pencils alone in the course of a single year," says one of them; "and if we didn't keep hammering at the boys, that figure would jump to $5,000 or $6,000 without realizing it."

He keeps check on the supplies that he issues. His stock of blank forms alone would do credit to a wholesale stationery house in a sizable city, for the railroad is a liberal user of printers' ink in its own devices. He must be thrifty and he must be economical; he must look to it that the railroad's money is not wasted in the purchase and use of its supplies.

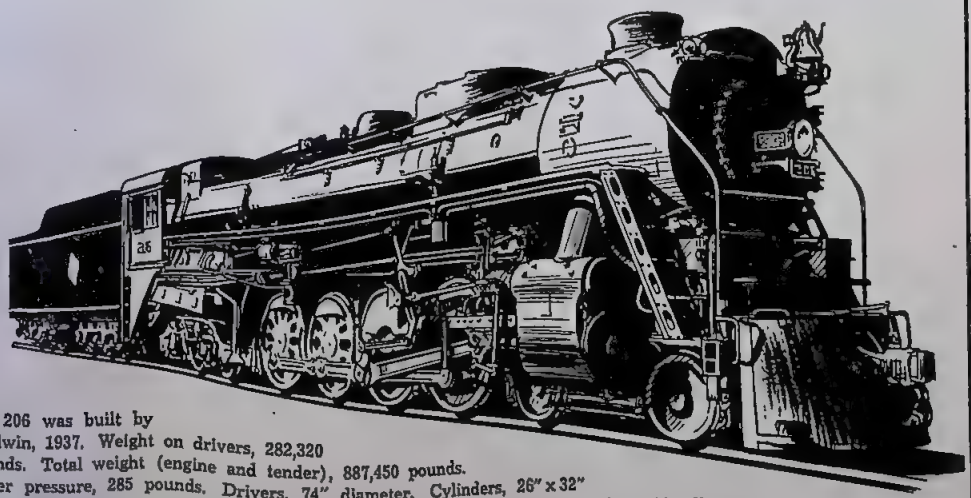
The treasurer, the comptroller, the purchasing agent and the storekeeper stand as guardians of the railroad's strongbox.

Answers from page 15.

Missouri-Kansas-Texas
Reading Railroad
Western Maryland
Baltimore & Ohio
Atlanta & West Point
Boston & Maine
Illinois Central
International Great Northern
New York, New Haven & Hartford
San Diego & Arizona Eastern
Spokane, Portland & Seattle
Chicago & North Western
Atlantic Coast Line
Gulf, Mobile & Northern
Akron, Canton & Youngstown
Bessemer & Lake Erie
Carolina, Clinchfield & Ohio
Lehigh Valley
Pennsylvania Railroad
Virginia & Truckee
Richmond, Fredricksburg & Potomac
Ann Arbor Railroad Company
Boston & Albany
Colorado & Southern
Butte, Anaconda & Pacific
East Jordan & Southern
Terminal Railroad Association of St. Louis
Delaware, Lackawanna & Western
Oklahoma Railway Company
Grand Trunk Western
New York, Chicago & St. Louis (Nickel Plate)
Atchison, Topeka & Santa Fe
Bangor & Aroostook
Canadian Pacific
Fort Worth & Denver City
Maryland & Pennsylvania
Peoria & Pekin Union
Toronto, Hamilton & Buffalo
Minneapolis, St. Paul & Sault Ste. Marie

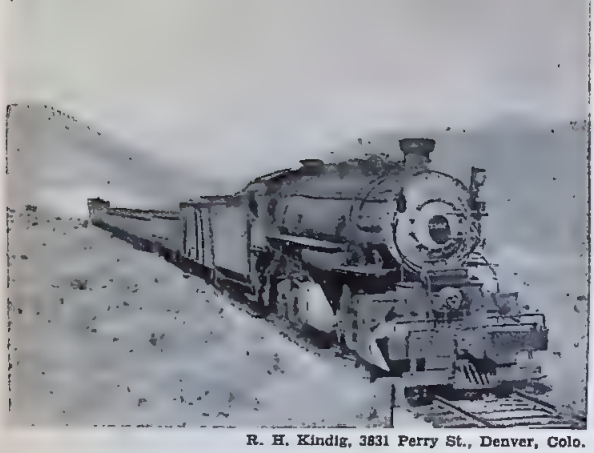
Milwaukee Road S-2

Lives there a man who has not thrilled to action such as this! The hardy gentleman hugging the caboose grabiron might be a member of Conductor Ed Bailey's crew, extra 1251 west. His watchful eyes are giving a fast Chicago-bound freight the once over, and if anything should be wrong the other crew will catch his "washout" signal in time to prevent possible disaster. Heading the long freight is one of the 40 Milwaukee Road S-2 4-8-4 dual service engines, Nos. 201 to 240. These engines are normally used for passenger service only in Summer when the Olympian runs extra heavy and an S-2 on the 915-mile run between Minneapolis and Harlowton saves an extra section. All 40 are kept plenty busy at present with the freight rush. As freight pullers they replaced some 70 Mikados, which in turn replaced older and lighter units, thus allowing some scrapping and a larger motive power reserve.



No. 206 was built by Baldwin, 1937. Weight on drivers, 282,320 pounds. Total weight (engine and tender), 887,450 pounds. Boiler pressure, 285 pounds. Drivers, 74" diameter. Cylinders, 26" x 32" (diameter and stroke). Tractive force, 70,816 pounds. Tank capacity, 25 tons coal; 20,000 gallons water. Length overall 110'-1¾".

GIL REID



R. H. Kindig, 3831 Perry St., Denver, Colo.

D&RGW true Mallet.

A true Mallet is an articulated locomotive with huge cylinders driving one of the engines with exhaust steam from the other. This 31-year-old 2-6-6-2 is crossing the Eureka summit with empty gondolas from the smelters near Salt Lake City. Tintic Loop is in the distant canyon.

Tintic, Utah

IN THE far West, 'way out beyond Denver and 'way, 'way beyond Indiana, there were two most important dates in history: 1848, when the lands west of the Rockies were turned over to the 30 United States by Spain; and 1869, when the Union Pacific and Central Pacific railroads met in Utah, forever obviating the torturous trips "around the Horn." The first of these dates would have been relatively unimportant had it not been for the discovery of precious metals, first in California, then in Nevada, Colorado, Arizona and Utah.

When Brigham Young led the Latter Day Saints to Utah, then called Deseret, or Land of the Working Honey Bee, he discouraged the search for precious metals among his people and so it was not until 1869, the year of the transcontinental railroad, that gold and silver were discovered in the Tintic district, 85 miles southwest of Salt Lake. Development was slow at first; it was difficult to ship the ore, and convenient smelters were as far as Reno, Nev., and even Wales, across the Atlantic. Later copper ore was added to the exports.

In 1883 the scene changed with the coming of the Salt Lake & Western from Ironton, where it interchanged with the Utah Southern. The two lines consolidated with the Utah & Nevada, the Utah & Northern, and the Echo & Park City in 1890 under Union Pacific management, as part of the Oregon Short Line. The next year the Rio Grande Western, now part of Denver & Rio Grande Western, built its winding track up the eastern slope of the mountains, bringing further prosperity to the mines and unwanted competition to the OSL.

The OSL became the main line to Los Angeles upon the completion of the San Pedro, Los Angeles & Salt Lake, putting the Tintic Range into the potential itinerary of the Pullman traveler.

Perhaps one of the most interesting railroad features in this almost treeless country is the loop of the D&RGW east of Eureka. The railroad ascends from the ancient bed of Lake Bonneville (a flat valley called Goshen), and turns into a narrow canyon after a short hairpin curve in a tunnel. Not far from the mouth of the dry stream bed a complete corkscrew loop is made to the right, up and over the main. Here a trestle 80 feet high spans highway, wash, old line and a new line just completed. The new line, however, will spell the death of the loop, for it replaces a section of 3 per cent track including the trestle with new, more direct 4 per cent trackage.

This might seem unusual, since most relocations are made with easier gradients, but the maintenance of the aging trestle was an expensive item, and the structure was able to support only the D&RGW's Class 3300 locomotives, which the company felt had done their life's work. The

R. H. Kindig.

Union Pacific Shay.

The UP's grades from Tintic Junction to Eureka and Robinson run as steep as 4 per cent, and the New East Tintic line to Mammoth Mine has a stretch of 6.1 per cent, so it is not strange to find this tough Shay geared engine resting between runs at Tintic Junction.

Linn H. Westcott.

Tintic mining district.

On this map one-half inch roughly represents one mile. The Tintic Range runs north and south, dividing Tintic Valley from Goshen Valley. Provo, Utah, and the main line of the D&RGW are located 30 miles to the east. The main line of the Union Pacific to Los Angeles touches the west edge of the district. Gold, silver and copper ores are found in rich pockets and veins on the western and upper eastern slopes of the mountains, making it necessary to run tracks at steep grades to reach the shipping points. Eureka is the principal town, but the first successful mine was near Dragon. Before the rails came this region was under a handicap.

J. W. Maxwell, 1416 Pennsylvania St., Denver, Colo.

new line, although steeper, will pass almost any kind of engine used on branch line service, and will shorten the length of rail and roadbed as well. It would have cost $120,000 to rebuild the trestle as against the $22,000 for the new line. The engines scheduled for operation are the 3400 class Mallets, newer than the 3300's. Since the upgrade movement is toward the mines, most of the cars will be empty over the 4 per cent section.

The New East Tintic Railway, now part of the Union Pacific, is the toughest bit of trackage; curves are sharp. Shay locomotives are employed to take the empties to Mammoth Mine.

Loop near Eureka.

The Rio Grande's approach from the east ascends Pinyon Canyon on a 3 per cent grade, making a complete loop over itself via this 461 x 80-foot trestle. To the right is the new 4 per cent line avoiding the trestle, which could support only Class 3300 locomotives.

A Locomotive Is Born

By Willard V. Anderson.

Courtesy Southern Pacific.

Electric welding on a Southern Pacific engine at Sacramento.

★ The engineering department strives for a design that will meet all operating needs.

A LOCOMOTIVE is born and comes into being; that is what the public sees. But before it can be born it must be conceived, and conceived in a manner to bring the greatest operating efficiency and profit to those who pay the costs of delivery and maintenance throughout the life of the hoped-for mechanical prodigy.

The railroad management which closely studies its property and its possibilities of improvement, particularly in the way of enlarging and speeding up performance within the range of economical operation, does not make its decision to buy or build its new type or new size or design of locomotive by any hit or miss process. It comes to a decision only after thorough consideration of its traffic problem, its competitive position among the other railroads of its operating zone and its connections, its handicaps in the way of grades, curves, abberations of wind and weather and other natural, financial and even political obstacles and obstructions.

It must also consider its roundhouses, shops, and terminal facilities and what the justification may be for increased expenditure for their possible enlargement or improvement in order that they may be able to handle efficiently whatever comes their way as a result of the increased operations. It must also have in mind the probable effects of the new locomotives on passenger or freight yards, stations, water and fuel supplying facilities, side and passing tracks, signal locations, curve conditions, and other roadside facilities. It must determine what, if any, changes or improvements must be made before the advent of the new type or size of locomotive. Furthermore, the question of the limiting influence of the present bridges must be taken into account and decision made as to whether they shall be strengthened or otherwise improved in order to favor the best performance from the new locomotives.

From all this it is clear that many departments of the railroad have a part in this most serious and careful survey and study. Assurance doubly sure is their watchword, but not entirely the governing factor; for railroads, like other progressive and venturesome organizations, must take some risk where they find it.

All of the foregoing is preliminary action whose aim is the preparation of a foundation upon which to base a study of the necessary character and general proportions of the proposed locomotive: its wheel arrangement, distributed weight, tractive effort, horse power, tender capacity of fuel and water, and the like. Included in this study must be consideration of the overhead and lateral restrictions of the roadway, station buildings and platforms, roundhouses, turntables, and other facilities which limit its permissible height, breadth, and over all length. I know of a case where a large and magnificent union station building was altered, in relatively minor matters of course, in order to favor the best design and performance of locomotives which had then only reached the designing stage. On curves, in particular, the spacing of adjacent tracks must not be overlooked because the so-called longitudinal overhang of the engine greatly increases its lateral sweep when rounding curves. In cases where the curved track must remain closely spaced it may be necessary to accept a relatively inferior design of locomotive as the best to be had under the circumstances.

It goes without saying that the first major decision of the railway management, after the survey, must be in the nature of what schedule of time and tonnage will be satisfactory for the new run or runs. With this information, and with a profile of the roadway and other pertinent data before him, the mechanical engineer of the railway now takes a more active and specific part. His way of looking at the job before him is that he must first prepare a rather complete specification which, when followed, will finally produce a locomotive which will not only be powerful and speedy enough to handle the schedule, but handle it with enough ease so that for a large part of its run it can be operated at the relatively short steam cutoffs which result in highly desirable economy in the use of fuel, the cost of fuel being one of the very great items in the cost of operating a railroad. Its

Upper, Southern Pacific; lower, Baldwin Locomotive Works.

Locomotives under construction.

At the top is a general view of the erecting shop at the Southern Pacific's general shops at Sacramento, where are located the largest railroad shops in the West. It is here that Southern Pacific has constructed many locomotives, the last road engines being some 4-8-2's during 1929 and 1930. Just below, a scene in Baldwin Locomotive Works as the front end of a Western Maryland 4-6-6-4 articulated engine begins to take form. Notice the boiler in the background. At the bottom of the page is another scene from SP's Sacramento shops as huge cranes lower the superstructure over the wheels of a Mountain type locomotive.

boiler must also be proportioned and designed with fuel economy in mind, and on passenger locomotives must be enough oversize so that it will be able to furnish the extra steam required for heating the train and also for lighting and air-conditioning it.

His first engineering step is to determne what resistance to starting the train will have under various operating conditions, then what added power must be available to accelerate the train up to its operating speed within the time allowed by the schedule. He is thus able to decide on what nominal tractive effort the locomotive must have and therefore what the "weight on drivers" should be. In round numbers, the weight on drivers is generally made four times the nominal tractive effort in order to provide a large enough factor of adhesion to substantially reduce the tendency of driving wheels to slip when full tractive effort is exerted. He next determines the least number of pairs of driving wheels the locomotive must have by dividing the weight on drivers by the maximum load on the rails permitted by the track department for one pair of driving wheels. Notice that the expression "weight on drivers" is merely a convenient misnomer, the actual situation being that it is the weight *under* the drivers, or the weight on top of the rails, which is under discussion.

He now has to decide what the diameter of the driving wheels shall be in view of the specific service into which the locomotive is to

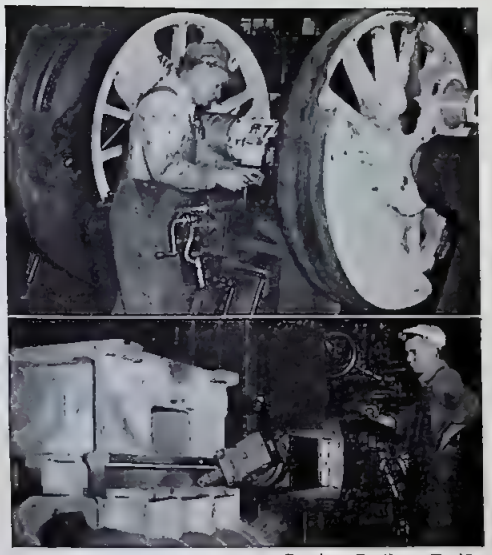
Courtesy Southern Pacific.

be placed. If the locomotive is to operate mainly in low-speed service, as in heavy grade territory, or in drag freight service, it is desirable to use relatively small driving wheels so that the peak of horse power is attained at the speed peak of that operating zone, as near as may be. If the peak of horse power is to be obtained at the higher operating speeds, as is the present tendency, the driving wheels are increased in diameter to suit. Nowadays the drivers are generally made as large as is possible consistent with a proper regard to the desirability of keeping the vertical center of gravity of the locomotive from rising unduly, and the necessity of keeping the "sky line" of the locomotive within the vertical clearances specified by the bridge and building department. Other considerations also have a bearing on the diameter of drivers. Among these are such things as piston speed, cylinder stroke, boiler diameter and the like. All this aside from the fact that where a locomotive must have many pairs of drivers because of its great weight, the drivers must necessarily be of relatively small diameter in order not to increase the length of the rigid wheel base beyond practical operating limits as determined by track curvatures.

The required size and general shape of the boiler is determined by the amount of steam which must be furnished and the quality of that steam as to initial dryness, pressure, and superheat. Feedwater heaters and the nature of the fuel also have a bearing on the general design, as have also various ratios used in boiler design to the end that the steam be produced with a relatively low rate of fuel consumption.

The weight of the boiler and its many appurtenances, also the weight of water and fuel within it, can now be estimated. The weight of all other parts of the complete engine are likewise estimated. The total of these weights, minus the weight on drivers, gives the estimated weights on the rails at the front and rear engine trucks and hence determine their wheel arrangement.

Having gone this far, the mechanical engineer can now construct a preliminary diagram and general specification of the new locomotive. He includes in the specification general information as to workmanship and required physical and other qualities of the materials used. He incorporates as many of the standard drawings as are directly applicable, to-



Courtesy Southern Pacific.

Turning, milling, boring.

Above, adjusting a driving-journal turning lathe. Below, a huge cylinder is bored and milled. The specifications below are excerpts from a railroad's specification sheet and later amendments. Notice how the engine's drivers were originally to be 74", then were changed to 70". A later amendment changed them back to 74".

Specification for 4-8-4 Bituminous-Burning Locomotives for High-Speed Freight Service.

This specification, and accompanying prints and material specification, are intended to cover a 4-8-4 type of freight locomotive to be particularly designed for high speed and long runs and having a weight on drivers not to exceed 270,000 pounds. Total weight of engine, not including a trailer booster, must not exceed 445,000 pounds. Special attention must be given to keeping down the weight on the front engine truck.

Locomotive must be complete in every respect, in full accordance with the requirements of all federal rules and regulations, and must incorporate in its design the railroad company's standard practices as far as practicable. Locomotive designed for 20-degree curves.

The sizes of journals shown in the diagram are tentative and are subject to such changes as a detailed study of the total weight and its distribution may require.

Locomotive and boiler designed for a working pressure of 250 pounds per square inch.

The general dimensions of the boiler . . . are subject to such changes as a detailed study of the design seems to require and as agreed upon by the railroad company, with the particular aim of getting the maximum of evaporative capacity, fuel economy and sturdiness coupled with the least total weight of engine. . . .

Cylinders, 28" x 30". Drivers, 74". Tender capacity, 24 tons coal, 21,500 gallons water.

Amendment No. 1 to General Specification for 4-8-4 Type Locomotives.

Make 4-8-4 locomotives as called for by general specification, except as follows:

(A) Make drivers 70" diameter, tires 4" thick.

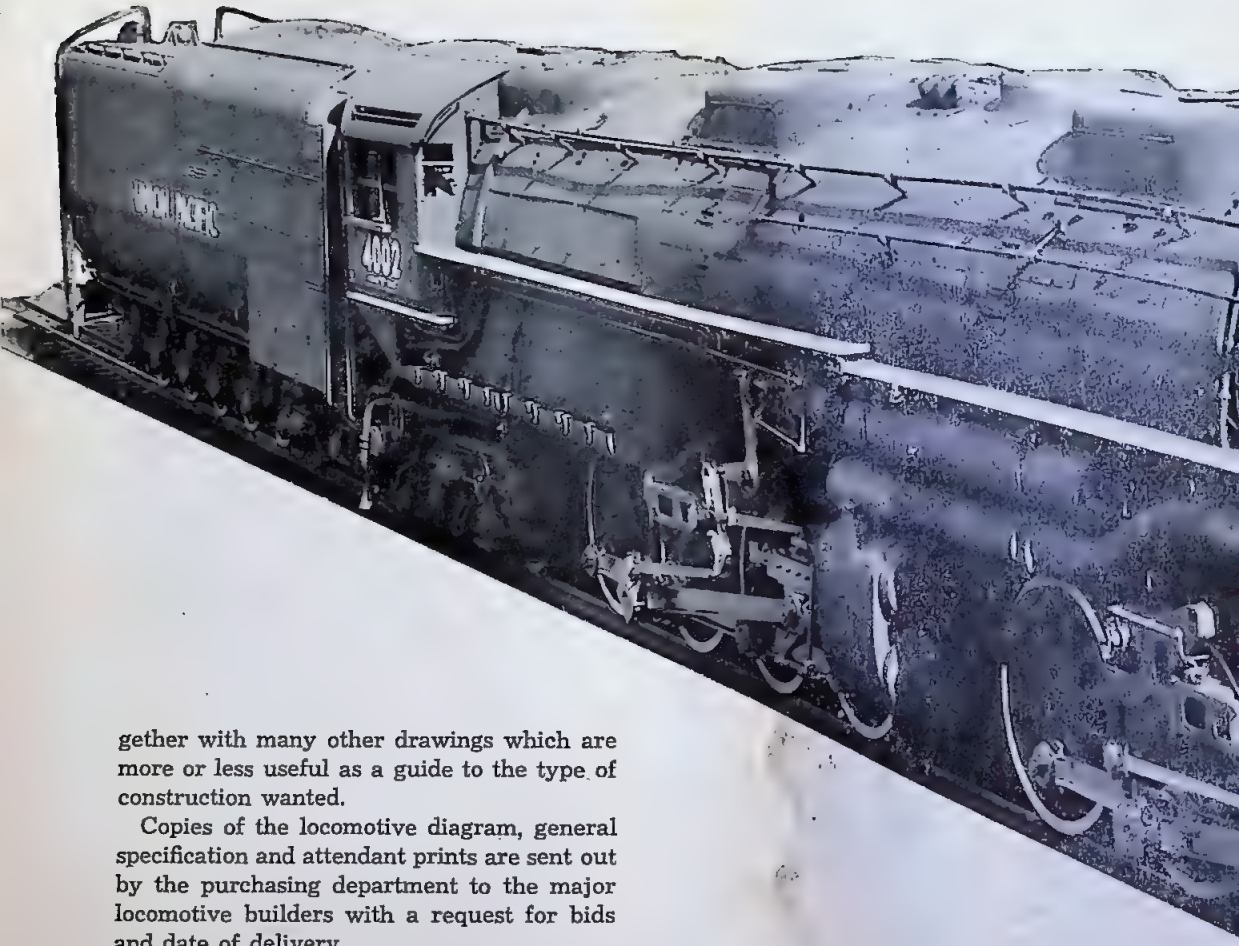
(B) Make cylinders 27" x 30", except that one locomotive is to have 27½" x 30" cylinders. The others to be designed for possible future boring out to 27½". . . .

(D) The spacing of the driving wheels to be determined as the design develops.

(E) Specification calls for 48¼" steel tired trailer wheels: We now want alternate price on 42½" steel tired trailer wheels. . . .

(K) Weight on drivers to remain at 270,000 pounds.

(L) Tender water capacity to be reduced to 18,000 gallons. Coal capacity to remain at 24 tons.



gether with many other drawings which are more or less useful as a guide to the type of construction wanted.

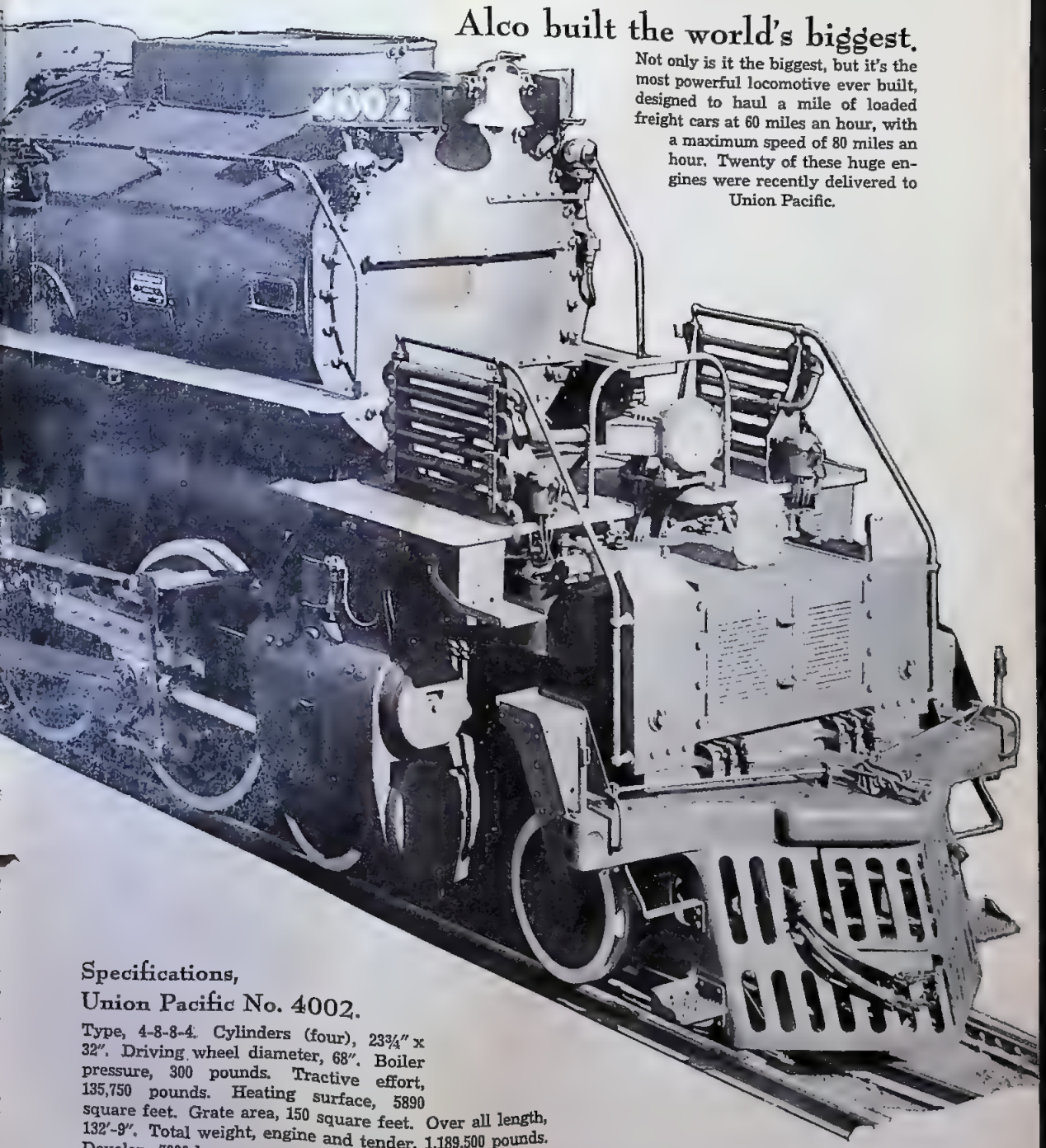
Copies of the locomotive diagram, general specification and attendant prints are sent out by the purchasing department to the major locomotive builders with a request for bids and date of delivery.

The contract having been let, some of the railroads require that the final detailing of the design be in cooperation between the railroad's mechanical engineer and the engineers of the builder. In that event he spends most of his time at the works of the builder until the first locomotive of the lot on order has been built, weighed, and accepted. This generally takes from five to seven months from the time the contract was let, depending upon the type of locomotive and assuming that orders from other railroads do not interfere.

During this time there are many conferences with the engineers of the various specialty manufacturers whose products are being included in the general design, particularly such important parts as integral frames and cylinders, engine and tender trucks, superheaters, feedwater heaters, stokers, brakes, and valve gears.

Meanwhile the growing weight of the locomotive is being carefully kept in mind and as far as possible certain parts are located in a manner to keep the longitudinal center of gravity of the locomotive close to the point shown by preliminary calculation to be desirable in order to best distribute the allotted weight to the various driving and truck wheels. The equalization system is carefully designed and arranged in accordance with an ever-increasing consideration for the track over which it must run, and the necessity, in these days of high wheel load, of a gradual and smooth easing of the locomotive into the track as it rolls along. This consideration for the track also leads to a most careful designing and balancing of those factors which produce the highly undesirable "hammer blow," or dynamic augment. High speeds have made designers especially considerate of the counterbalancing, a big factor in producing hammer blow.

But it must not be supposed that a structure as dynamically complicated as a reciprocating steam locomotive is while running can be designed with an eye to having each and every part a piece of perfection all by itself. To produce a successful locomotive it is necessary to sacrifice perfection in some parts and functions in order to attain nearer to per-



Alco built the world's biggest.

Not only is it the biggest, but it's the most powerful locomotive ever built, designed to haul a mile of loaded freight cars at 60 miles an hour, with a maximum speed of 80 miles an hour. Twenty of these huge engines were recently delivered to Union Pacific.

Specifications, Union Pacific No. 4002.

Type, 4-8-8-4. Cylinders (four), 23¾" x 32". Driving wheel diameter, 68". Boiler pressure, 300 pounds. Tractive effort, 135,750 pounds. Heating surface, 5890 square feet. Grate area, 150 square feet. Over all length, 132'-9". Total weight, engine and tender, 1,189,500 pounds. Develops 7000 horse power.

fection in other and more important parts and functions, and it can reasonably be said that, other things being equal, the best locomotive designer is he who steers the best course among the many conflicting factors which have to be considered.

In this manner, the engine assumes form and substance and is finally delivered to an admiring world. And then some railfan, not realizing all the labors of design, is over critical of the way the sand domes or other external features are placed.

Know Your AMERICA

. . . The United States is beautifully portrayed in this new triumph of the map maker's art.

THE MAP is an actual colored lithographic reproduction of a raised relief, incorporating the missing link in all previous maps, height. This unique map is the creation of Theo. W. Ohman, whose work has been acclaimed by leaders of industries, educators, and other renowned map makers. He has spent many years in the development of an original process for making fine-detail relief maps and later, through his own method, created this reproduction which appears to be actually raised.

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AMERICAN GROWTH - Know your country. From this map which so well portrays the geographical features of our land learn how and why the country grew, see how early development followed the rivers, how the first railroads influenced development and why they were built; see how terrain in the early days shaped the distribution areas of today.

ARTISTIC, TOO - The map size is 36" x 23", large enough for plenty of detail and yet handy for home hanging. Each copy is artistically combined with a horizon of the United States, together with text, "Our Country," printed in five colors across the top. Key to the map is printed on the reverse side, and each map is attached to metal strips ready for hanging. Price, postpaid, $3.50.

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Letters

★ Interesting sidelights on railroads as readers observe them.

One Train: Four Photos.

IN ALMOST every section of the United States the railroads are streamlining their finest trains. Most railfans like to see these fast, sleek streamliners, but some of us also like to remember those good old days when crack limiteds and specials were hauled by powerful, fast steam jacks—engines with all of the gadgets showing.

In my collection of train photos I still prize pictures of fine passenger trains that were not streamlined only a few years back. I am enclosing four, showing the Atlantic Coast Line's *Florida Special,* both East Coast and West Coast sections of that famous train, now Diesel-powered. On the March, 1939, morn-

Florida Special, East Coast, two sections.

ing that these were taken both the East Coast and the West Coast were run in two sections. The photos were taken at Richmond, Va.

Wiley Marion Bryan.

406 E. Geer St., Durham, N. C.

London Is "Up."

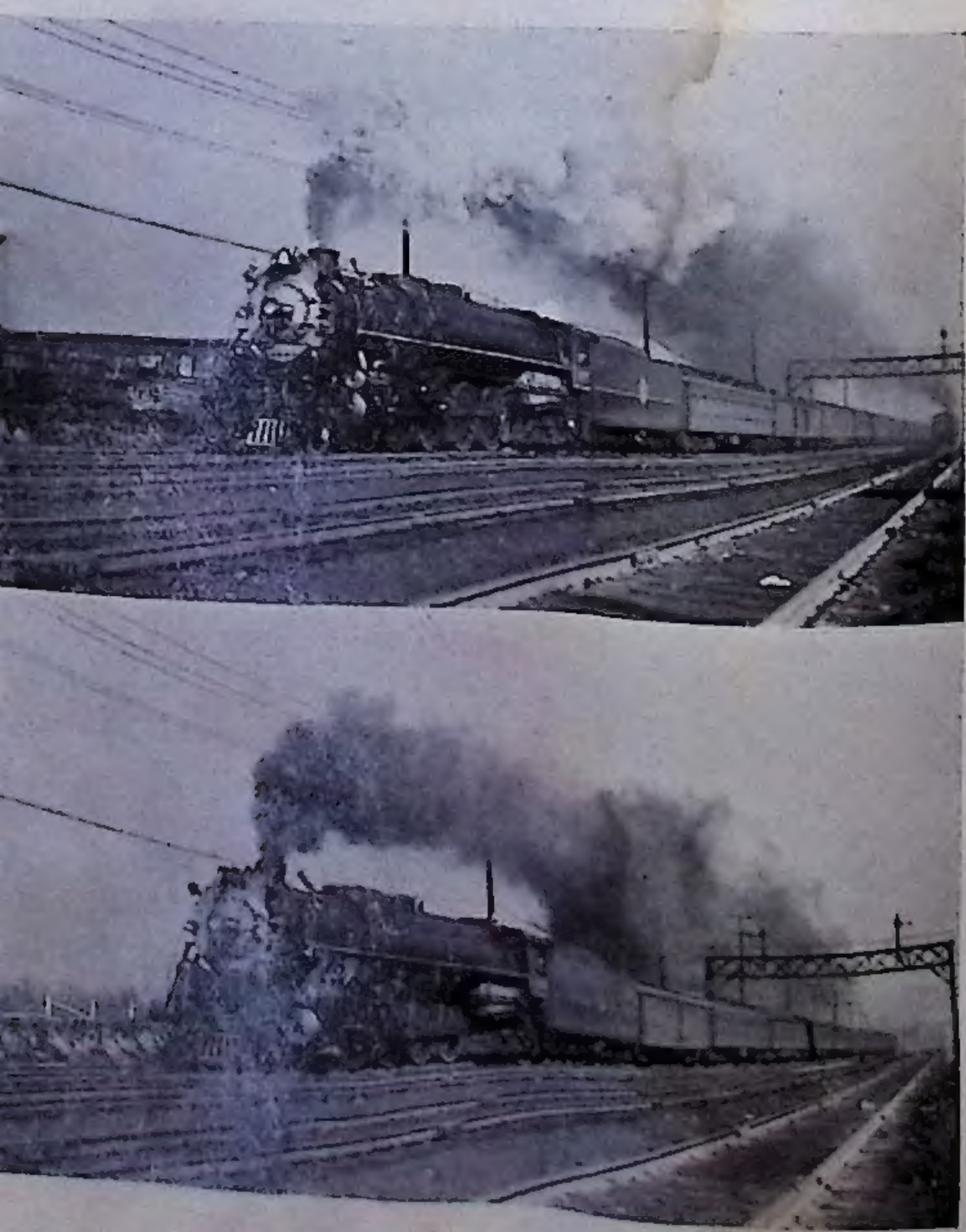
In the October issue of Trains I find one error which should be called to your attention. It occurs in "British Portfolio," on page 16: "The track from London is called the Up Main, toward London the Down." This statement happens, unfortunately, to be in reverse! In England people always go *up* to London, from whatever geographical direction; London-bound trains are the *up* trains, and people catch the 5:10 *down* from Paddington or Waterloo.

Arthur Motter Lamb.

Middlesex School, Concord, Mass.

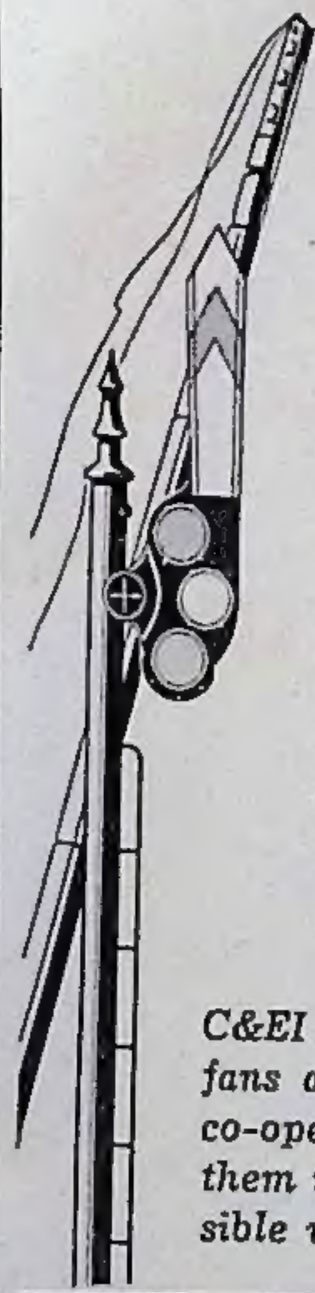
[James T. Wilson, 138-30 Northern Boulevard, Flushing, N. Y., in commenting on the same error in terminology, points out an interesting paradox: The LMS or LNE down tracks are northbound, while the Southern down track is southbound. Thanks to Mr. Wilson, Mr. Lamb and to several others for correcting the error.]

Florida Special, West Coast, two sections.



Wiley Marion Bryan.

ASK ANY **Railfan** ABOUT THE **Dixie Route** TO FLORIDA



Any railfan who has made the Chicago to Florida run via the **Dixie Route** will tell you that mile for mile it's one of the most interesting routes in all America. It takes you through the heart of the scenic-historic South—Nashville, Chattanooga, Big Moccasin Bend, Lookout Mountain, Atlanta—and all Florida—over one of the nation's finest roadbeds. **Dixie Route** trains are famous for speed and comfort. The **Dixie Flagler**, luxury-coach streamliner, is a notable example of modern American train design.

C&EI is glad to number so many railfans among its friends and wishes to co-operate with them in all possible ways.

C&EI

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The Month

★ New facsimile machines aid in delivery of train orders.

★ The telegraph is one of the old institutions of railroading, but the old order changes for the new and telegraph is being rapidly displaced. More than half of American railroad mileage is now dispatched by telephone, and the teletypewriter is widely used for message service. Similarly, the train order is one of the old established railroad institutions, but the train order has been giving way in recent years to centralized traffic control, a system of interlocked remote control signaling by which the dispatcher can directly and with perfect safety control train movements by signal indications over any part of his division. Now an offshoot of old institution number one, the telegraph, comes to the rescue of old institution number two, the train order. Western Union has developed facsimile sending and receiving equipment to a very practical stage and the Pennsylvania Railroad has ordered one-way facsimile machines for use in sending messages from a central point to unattended train order offices. An operator can, by the use of these machines, write out train orders for delivery to train crews at a remote point and thus improve the economy and efficiency of railroad dispatching by train order.

★ American Railroads passed the much feared October peak of carloadings with no car shortage. The traffic peak fell far short of what had been predicted in some government quarters, apparently because the decline in normal activities which accompanied the upswing of war business had not been taken into account by the officials.

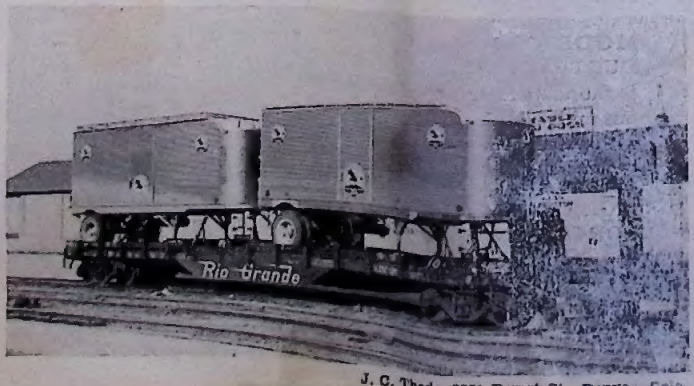
★ Truck and railroad freight service on the Denver & Rio Grande Western has been effectively coordinated by the use of special flat cars on which truck semi-trailers can be transported over the railroad. The special flat cars are fitted out with steam line and passenger brake equipment so that they can be hauled in passenger trains between Pueblo and Alamosa. Service is likewise offered between Denver and Pueblo, Salida, and Grand Junction. The special flat cars were reconstructed from old automobile cars. Trailers belong either to the Rio Grande Motorways, a Rio Grande subsidiary, or to private owners such as Safeway Stores. An all-truck trip between Grand Junction and Denver takes 18 hours, whereas the railroad now performs the same service at less cost in about 15 hours. Watch for more railroad-trailer services in the future.

★ Chicago-Florida service of the Pennsylvania, the Chicago & Eastern Illinois and the Illinois Central railroads will be coordinated effective December 17 so as to provide by cooperation a better service than any of three railroads were able to offer individually. Not only will all-coach streamliner service continue to be performed in turn by each of the three roads (every third day on each route) on identical schedules, but a new, fast, one-night all-Pullman train with morning departure (and an evening train, beginning January 1) will likewise be run every third day over each of the three roads so as to provide joint daily service. Each of the roads will also continue certain every-day trains by its own route to provide service to intermediate points.

★ *Fan Trip*: From Akron, O., New Year's Day at 10:30 a.m. over the Akron, Canton & Youngstown on its mixed train to New London or wherever the eastbound train is met, arriving back at Akron about 4:30 p.m. Sponsor, Eastern Ohio Chapter, N. R. H. S.; Robert W. Richardson, 34 S. Union Street, Akron.

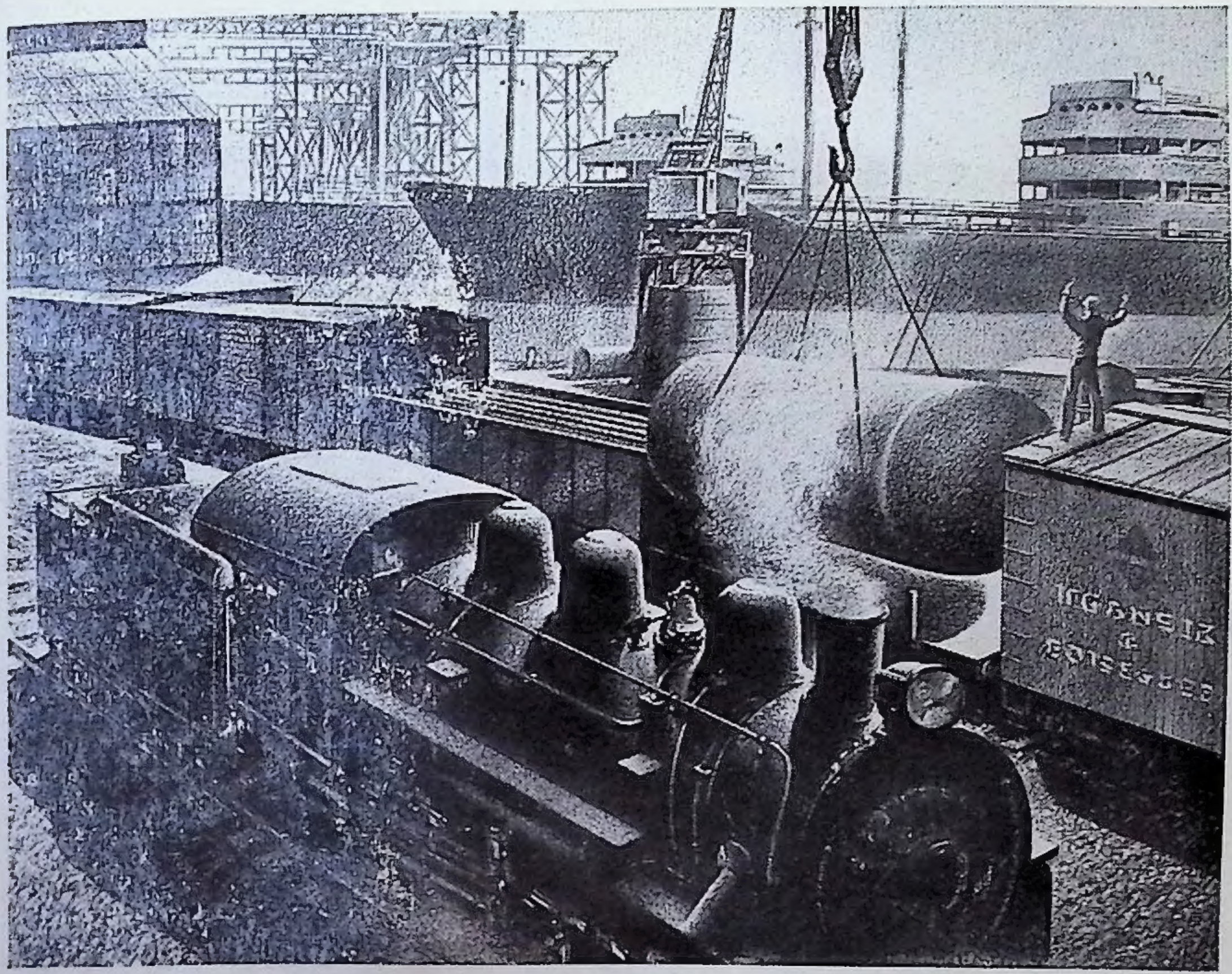
★ The *Arizona Limited*, streamlined paystreak, will again be operated this Winter between Chicago and Arizona by the Rock Island and Southern Pacific railroads. You haven't heard this train called "most popular," but it is a deluxe, all-room extra-fare train, which with a passenger list much shorter than the popular coach streamliners can still turn in a very pleasant profit to its owners. Last year it was booked to capacity throughout almost the entire season.

★ The Chicago, Burlington & Quincy is making a survey of possible purchase of the Illinois Terminal Railroad, including the extensive switching properties in and around St. Louis and the electrically operated main lines extending to Peoria and Danville, Ill. (fully described in TRAINS, September 1941).



J. C. Thode, 2251 Forest St., Denver, Colo.

Trucks by train.
The Denver & Rio Grande Western uses special flat cars like this to haul truck semi-trailers which are then hitched to regular tractors for local and off-line deliveries. The service is both faster and less expensive than the use of trucks all the way.



WE'RE SHIPPING SHIPS BY RAIL

FROM scores of shipyards along American coasts is being launched the "Bridge of Ships" so vital to our defense. And the hulls are going into the water at record speed because these ships are being put together with modern methods.

MODERN MASS PRODUCTION makes it possible to fabricate the parts in various mills all over the country with the efficiency that comes of specialization.

MODERN MASS TRANSPORTATION by rail makes it possible to schedule deliveries so that the parts arrive just as they are needed. This shipping precision has another advantage — it enables each car to do more work. Cars are used only for transportation — never for storage.

Through carefully planned cooperation with government departments and shippers, the railroads are taking on one extra job after another and still are keeping everything moving right on schedule. No other form of transportation could come close to handling so great a job so smoothly, so economically.

America can look to its railroads with full confidence, for they are keeping abreast of all demands and are preparing to meet future needs of peacetime commerce and national defense.

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ASSOCIATION OF AMERICAN RAILROADS, Washington, D. C.

Trains

Taking Water.

Noel Hiram Deeks. See page 3..